2013 Air Quality Progress Report for
West Lothian Council

In fulfillment of Part IV of the
Environment Act 1995
Local Air Quality Management

March 2014

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Executive Summary

This report is the 2013 Progress Report undertaken in accordance with West Lothian Council's statutory obligation under the National Air Quality Strategy.

The report considers measured pollutant concentrations from within West Lothian for the calendar year 2012 and considers the potential for exceedences of Air Quality Objectives as a result of new or significantly changed local emission sources.

Measured pollutant concentrations across the Council area in 2012 were generally similar to those measured in 2011. Broxburn NO_2 concentration remains above objective levels therefore the Air Quality Management Area here is retained. The longer term trend apparent at sites outside Broxburn shows no increase or decrease except in Linlithgow High Street where diffusion tube surveys indicate exceedences in NO_2 concentration and will proceed to a Detailed Assessment.

Measured PM_{10} annual mean concentrations at all sites were below air quality objective levels.

Rusha opencast coal mine is the only new or significantly changed emission sources identified within West Lothian which has potential to cause exceedences of air quality objectives.

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1   Introduction

1.1   Description of Local Authority Area

West Lothian is situated between Edinburgh and the Borders to the east, Falkirk, and North Lanarkshire to the west and South Lanarkshire to the south with the Firth of Forth to the north. The region rises from the lowlands in the north and northeast to the Pentland Hills in the southeast and moor land in the south and west. Its 428 sq. km (165 sq. miles) are mainly used for agriculture or urban development. The major source of air pollution is from road traffic with several main roads including the M8, M9, A89 and A71 passing east-west through the district. Industrial sources of air pollution in West Lothian are relatively scarce and are mostly situated in designated industrial areas away from relevant receptors.

1.2   Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the

risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3   Air Quality Objectives

The air quality objectives applicable to LAQM **in Scotland** are set out in the Air Quality (Scotland) Regulations 2000 (Scottish SI 2000 No 97), the Air Quality (Scotland) (Amendment) Regulations 2002 (Scottish SI 2002 No 297), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre µg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1   Air Quality Objectives included in Regulations for the purpose of LAQM in Scotland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	**Measured as**	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	3.25 µg/m^3	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM$_{10}$) (gravimetric)	50 µg/m^3, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg/m^3	Annual mean	31.12.2010
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4   Summary of Previous Review and Assessments

Report Type	Report Date	Outcomes
Review and Assessment Stages 1 and 2	October 2000	• Prescribed air quality objectives are all likely to be achieved. • Recommended that current air quality monitoring work in West Lothian be continued.
Updating and Screening Assessment	June 2003	• Objectives for both NO_2 and PM_{10} currently being met. To continue monitoring in worst-case situations including locations close to busy roads. • No need for Detailed Assessment of Benzene, however consideration to be given for monitoring at petrol stations at Deer Park and Lizzie Bryce roundabouts. • No need for further monitoring of 1,3-Butadiene and Lead. • No need for Detailed Assessment of CO or SO_2
Progress Report	2004	• No Detailed Assessments required for any pollutant. • Benzene to be monitored at Lizzie Bryce petrol station.
Progress Report	2005	• Groundhog moved to Cairnie Place, Whitburn from 31/01/2005 • NO_2 analyser problems, low data capture. • One exceedence of 24-hour mean PM_{10} due to elevated background. • No Detailed Assessments required for any pollutant.
Updating and Screening Assessment	July 2006	• No exceedences of any pollutant therefore no requirement to proceed to a Detailed Assessments for any pollutant.
Progress Report	April 2007	• No exceedences of any pollutant therefore no requirement to proceed to a Detailed Assessments for any pollutant. • Monitoring of Benzene to cease due to low measured concentrations.

		• PM_{10} very close to objective in Linlithgow. • Automatic monitoring of NO_2 proposed for Broxburn.
Progress Report	March 2008	• No exceedences of any pollutant therefore no requirement to proceed to a Detailed Assessments for any pollutant. • Automatic monitoring of NO_2 and PM_{10} proposed for Broxburn. • Upgrade to FDMS planned at Linlithgow
Updating and Screening Assessment	September 2009	• No exceedences of any of the pollutants objective values. • Real time monitoring to continue in Linlithgow and Broxburn. PM_{10} concentration at Linlithgow close to objective with elevated levels measured at Broxburn. • NO_2 diffusion tubes to be deployed in West Calder Main Street for Detailed Assessment. • A poultry farm was identified as requiring a Detailed Assessment. • Further traffic surveys required to assess identified busy roads/junctions using DMRB. • Mobile monitoring station (Groundhog) to be relocated to Uphall Station. • Osiris units measuring to be deployed at various locations throughout West Lothian.
Progress Report	June 2010	• Poultry farm detailed assessment not required per Scottish Government advice. • Broxburn exceeded annual PM_{10} objective, detailed assessment to be undertaken
Progress Report	July 2011	• Groundhog relocated to Whitburn Cross providing data from 08/02/10. • Monitoring at Broxburn continued to exhibit an exceedence ($21\mu g/m^3$) of the PM_{10} annual objective. A Detailed Assessment (DA) was commissioned. • A diffusion tube survey was also undertaken in Broxburn in 2010 which highlighted elevated concentrations of NO_2 levels. Potential for an Air Quality Management Area (AQMA) to be declared for PM_{10} and potentially NO_2. • Monitoring at Linlithgow High Street in 2010 highlighted a reduction in PM_{10}

		concentrations, however poor data capture was experienced. Measured concentrations in Linlithgow identified to be close to exceedence of PM_{10} annual objective level, continuing trend. It was therefore considered for a DA to be undertaken. • A diffusion tube survey for NO_2 in West Calder was undertaken as recommended in the 2009 Progress Report. The levels of concentration were well below the annual objective level. The survey continued through 2011.
Updating and Screening Assessment	October 2012	• Monitoring at Broxburn continued to exhibit exceedences of both the PM_{10} and NO_2 annual objectives. • Broxburn DA recommended AQMA declaration for PM_{10} and NO_2 annual objectives. • Broxburn AQMA declared 29/03/11 • Linlithgow DA recommended AQMA for annual PM_{10} objective. Declaration to be postponed until analysers moved to worst case position.

Figure 1.1   Map of AQMA Boundaries

Broxburn AQMA boundary is detailed in Figure 1.1 in Appendix B

2 New Monitoring Data

During 2012 West Lothian Council monitored both PM_{10} and NO_2 at several locations throughout the Council area using both automatic and passive sampling methods.

All automatic monitoring PM_{10} and NO_2 data have been fully ratified by Ricardo-AEA on behalf of the Scottish Government (detailed in Appendix A). Diffusion tube data have been corrected using a local bias correction (detailed in Appendix C). Details of the quality control and data correction are reported in Appendix A.

2.1 Summary of Monitoring Undertaken

West Lothian Council monitor PM_{10} and NO_2 using a combination of automatic analysers and passive diffusion tubes (PDT). The automatic monitoring sites are presented in Table 2.1 and the details of non-automatic monitoring sites are presented in Table 2.2.

2.1.1 Automatic Monitoring Sites

During 2012 the Council operated three real time automatic analysers at four locations. The Groundhog mobile unit at Whitburn Cross was decommissioned on 03/04/12 due to consistent low pollutant levels. A new automatic monitoring site was established at Newton from 23/05/12.   The two other automatic analysers continued to operate at Broxburn East Main Street (CMC) and Linlithgow High Street (Romon 300).

Figure 2.1   Map of Automatic Monitoring Sites

All monitoring site locations are detailed in Figure 2.1 Appendix B

Table 2.1   Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
CM1	Linlithgow ROMON	Roadside	299989	677090	2.4m	PM_{10} NO_2	N	FDMS NO_x analyser	Y(-5.5m)	7m	N
CM2	Broxburn CNC	Roadside	308314	672231	2.3m	PM_{10} NO_2	Y	FDMS NO_x analyser	Y(3.5m)	2m	Y
CM3	Whitburn Groundhog	Roadside	294659	664942	3.0m	PM_{10} NO_2	N	FDMS NO_x analyser	Y(0m)	5m	Y
CM4	Newton CNC	Roadside	309258	677728	2.4m	PM_{10} NO_2	N	FDMS NO_x analyser	Y(2.0m)	2.4m	Y

2.1.2   Non-Automatic Monitoring Sites

The Council added to its network of diffusion tubes in 2012 to create a total of 42 tubes at 20 sites. Additional diffusion tube coverage was added in the street canyon at the east end of Linlithgow High Street, with four new sites set up on 06/01/12 and an additional two sites on 22/06/12. The monitoring sites represent public exposure and areas of high pollution concentrations at a variety of roadside and urban background locations. There are 2 tubes at 18 sites and 3 tubes co-located with the real time analysers at Linlithgow High Street and Broxburn West Main Street. Diffusion tube data remains valuable and the Council is committed to making it publicly available. The Council has therefore continued to input data on the web based data entry system.

Diffusion tube QA/QC is detailed in Appendix A.

Figure 2.2   Map of Non-Automatic Monitoring Sites

All monitoring site locations are detailed in Figure 2.1 in Appendix A

Table 2.2   Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DT1	Newton	Roadside	309223	677711	2.5	NO_2	N	N	Y(3m)	2m	Y
DT2	Broxburn WMS	Roadside	308165	672222	2.0	NO_2	Y	N	Y(Façade)	3m	Y
DT3	Broxburn EMS	Roadside	308426	672233	2.5	NO_2	Y	N	Y(1.5m)	4m	Y
DT4	Broxburn CNC	Roadside	308314	672231	2.2	NO_2	Y	Y	Y(3m)	2m	Y
DT5	Broxburn E Mains	Roadside	309368	672213	2.3	NO_2	Y	N	Y(4m)	2m	Y
DT6	Dedridge Ced. Rise	Urban Background	306403	666341	2.4	NO_2	N	N	Y(4m)	3m	N
DT7	West Calder	Roadside	301758	663158	2.4	NO_2	N	N	Y(2m)	2m	Y
DT8	Whitburn Cross	Roadside	294687	665030	2.1	NO_2	N	N	Y(Façade)	3m	Y
DT9	Armadale Cross	Roadside	293842	668588	2.4	NO_2	N	N	Y(2m)	2m	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DT10	Bathgate S Bridge	Roadside	297401	668772	2.2	NO_2	N	N	Y(Façade)	3m	Y
DT11	Bathgate Steelyard	Roadside	297467	668734	2.5	NO_2	N	N	Y(12m)	4m	Y
DT12	Bathgate King St	Roadside	297570	668586	2.5	NO_2	N	N	Y(5m)	4m	Y
DT13	Bathgate High St	Urban Background	297656	669298	1.8	NO_2	N	N	Y(3m)	10m	N
DT14	Linlithgow ROMON	Roadside	299989	677090	2.3	NO_2	N	Y	Y(-5.5m)	7m	Y
DT15	Linlithgow H St NW	Roadside	299930	677070	2.5	NO_2	N	N	Y(Façade)	1.4m	Y
DT16	Linlithgow H St SW	Roadside	299911	677052	2.5	NO_2	N	N	Y(2m)	2.9m	Y
DT17	Linlithgow H St NE	Roadside	300479	677148	2.5	NO_2	N	N	Y(3.4)	2m	Y
DT18	Linlithgow H St SE	Roadside	300485	677125	2.5	NO_2	N	N	Y(7.5m)	2.2m	Y
DT19	Linlithgow H St N	Roadside	300398	677132	2.5	NO_2	N	N	Y(Façade)	2.4m	Y
DT20	Linlithgow H St S	Roadside	300405	677118	2.5	NO_2	N	N	Y(Façade)	3m	Y

2.2   Comparison of Monitoring Results with Air Quality Objectives

The following section considers measured PM_{10} and NO_2 concentrations and compares the monitoring results with the relevant air quality objective.

Nitrogen Dioxide (NO_2)

During 2012 the Council monitored NO_2 using three real time automatic analysers at four locations. The Groundhog mobile unit at Whitburn Cross was decommissioned on 03/04/12 and a new automatic monitoring site utilising an automatic NOx analyser was established at Newton from 23/05/12.   The two other automatic analysers continued to operate at Broxburn East Main Street (CMC) and Linlithgow High Street (Romon 300).

Automatic Monitoring Data

The annual mean and 1-hour mean NO_2 automatic monitoring data for 2012 and previous years are presented in **Tables 2.3** and **2.4**. Trends in the annual mean NO_2 concentrations measured at automatic monitoring sites are illustrated in **Figure 2.3**. Measured exceedences of National Air Quality Strategy objectives are highlighted in bold.

Data capture at Linlithgow and Broxburn was considered good at well above 90%. As Whitburn and Newton were both only operating for part of the year annual data capture was less than 90% and both these sites data required annualisation.

Measured concentrations are below the annual mean objective for NO_2 at Linlithgow (CM1), Whitburn (CM3) and Newton (CM4). The measured annual mean NO_2 concentration at Broxburn (CM2) in 2012 was $45\mu g/m^3$ which remains above the annual mean objective level of $40\mu g/m^3$.
There were no measured exceedences of the 1-hour objective for NO_2.

Table 2.3 **Results of Automatic Monitoring for NO$_2$: Comparison with Annual Mean Objective**

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2012 % [b]	Annual Mean Concentration (μg/m^3)				
					2008* [c]	2009* [c]	2010* [c]	2011* [c]	2012 [c]
CM1	Roadside	N	99.1	99.1	20	21	26	18	18
CM2	Roadside	Y	97.2	97.2	40	39	**46**	**43**	**45**
CM3	Roadside	N	100	25.5	N/A	N/A	17	22	19 [c]
CM4	Roadside	N	97.9	60.5	N/A	N/A	N/A	N/A	32 [c]

In bold, exceedence of the NO$_2$ annual mean AQS objective of 40μg/m^3

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] Annualised means

Figure 2.3   Trends in Annual Mean NO$_2$ Concentrations Measured at Automatic Monitoring Sites
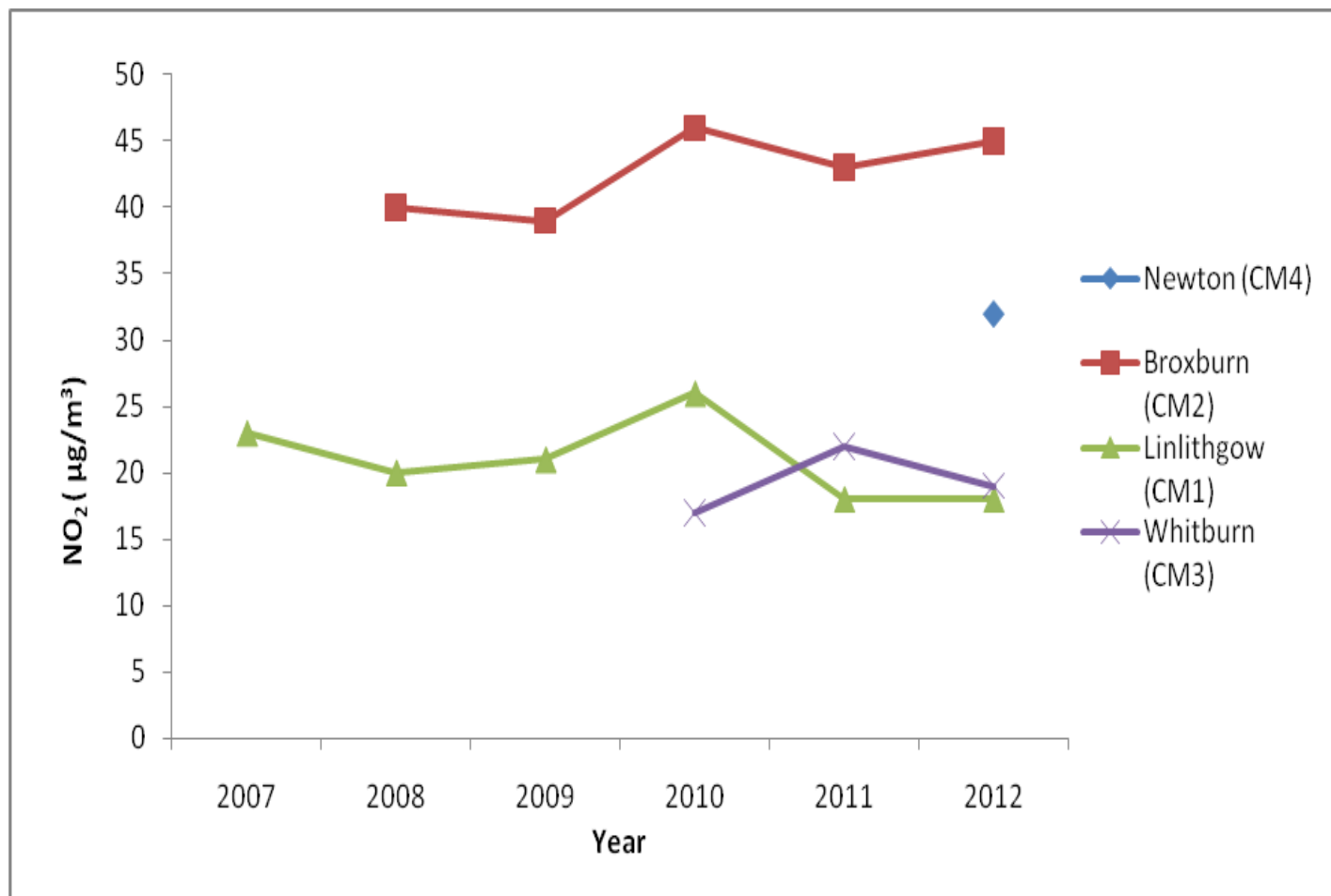
Broxburn continues to exhibit an annual NO$_2$ concentration above the annual objective of 40µg/m^3. All other sites are well below this level.

Table 2.4   Results of Automatic Monitoring for NO$_2$: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2012 % [b]	Number of Hourly Means > 200µg/m^3				
					2008* [c]	2009* [c]	2010* [c]	2011* [c]	2012 [c]
CM1	Roadside	N	99.1	99.1	0	0	0 (149)	0	0
CM2	Roadside	Y	97.2	97.2	0 (126)	1	0	0	0
CM3	Roadside	N	100	25.5	0 (111)	0 (82)	0 (59)	0	0 (78)
CM4	Roadside	N	97.9	60.5	N/A	N/A	N/A	N/A	0 (147)

In bold, exceedence of the NO$_2$ hourly mean AQS objective (200µg/m^3 – not to be exceeded more than 18 times per year)

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] If the data capture for full calendar year is less than 90%, include the 99.8th percentile of hourly means in brackets

* Number of exceedences for previous years is optional

Diffusion Tube Monitoring Data

The NO$_2$ diffusion tube monitoring data for 2012 and previous years are presented in **Tables 2.5** and **2.6** respectively. At diffusion tube locations where data capture is less than 75% it has been necessary to annualise measured concentrations.

The diffusion tube monitoring results have been adjusted for laboratory bias and where appropriate corrected for distance. Details of bias adjustment factors are explained in Appendix A. Trends in the annual mean NO$_2$ concentrations measured at roadside diffusion tube sites with historic data are illustrated in **Figure 2.4**.

Table 2.5   Results of NO$_2$ Diffusion Tubes 2012

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2012 (Number of Months or %) [a]	2012 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 1.09[b]
DT1	Newton	Roadside	N	N	12	37
DT2	Broxburn WMS	Roadside	Y	N	11	39
DT3	Broxburn EMS	Roadside	Y	N	12	38
DT4	Broxburn CNC	Roadside	Y	Triplicate and Co-located	12	39[b]
DT5	Broxburn E Mains	Roadside	Y	N	12	39
DT6	Dedridge Ced. Rise	Urban Background	N	N	12	19
DT7	West Calder	Roadside	N	N	12	31
DT8	Whitburn Cross	Roadside	N	N	11	37
DT9	Armadale Cross	Roadside	N	N	12	34
DT10	Bathgate S Bridge	Roadside	N	N	12	25
DT11	Bathgate Steelyard	Roadside	N	N	12	38
DT12	Bathgate King St	Roadside	N	N	12	37

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2012 (Number of Months or %) [a]	2012 Annual Mean Concentration ($\mu g/m^3$) - Bias Adjustment factor = 1.09[b]
DT13	Bathgate High St	Urban Background	N	N	12	15
DT14	Linlithgow ROMON	Roadside	N	Triplicate and Co-located	12	26
DT15	Linlithgow H St NW	Roadside	N	N	12	**43**
DT16	Linlithgow H St SW	Roadside	N	N	11	**42**[b]
DT17	Linlithgow H St NE	Roadside	N	N	12	35
DT18	Linlithgow H St SE	Roadside	N	N	12	31[b]
DT19	Linlithgow H St N	Roadside	N	N	6	**41**[a]
DT20	Linlithgow H St S	Roadside	N	N	6	**45**[a]

In bold, exceedence of the NO_2 annual mean AQS objective of $40\mu g/m^3$

Underlined, annual mean > $60\mu g/m^3$, indicating a potential exceedence of the NO_2 hourly mean AQS objective

[a] Means should be "annualised" as in Box 3.2 of TG(09)(http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38), if full calendar year data capture is less than 75%

[b] If an exceedence is measured at a monitoring site not representative of public exposure, NO_2 concentration at the nearest relevant exposure should be estimated based on the "NO_2 fall-off with distance" calculator (http://laqm.defra.gov.uk/tools-monitoring-data/no2-

falloff.html), and results should be discussed in a specific section. The procedure is also explained in Box 2.3 of Technical Guidance LAQM.TG(09) (http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=30).

Table 2.6   Results of NO$_2$ Diffusion Tubes (2008 to 2012)

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]				
			2008 (Bias Adjustment Factor = 0.88)	2009 (Bias Adjustment Factor = 0.89)	2010 (Bias Adjustment Factor = 1.08)	2011 (Bias Adjustment Factor = 1.04)	2012 (Bias Adjustment Factor = 1.09)
DT1	Roadside	N	N/A	N/A	33	32	37
DT2	Roadside	Y	N/A	N/A	**49**	35	39
DT3	Roadside	Y	N/A	N/A	**40**	36	38
DT4	Roadside	Y	N/A	N/A	**47**	36[b]	39[b]
DT5	Roadside	Y	N/A	N/A	**40**	37	39
DT6	Urban Background	N	13	14	21	17	19
DT7	Roadside	N	N/A	N/A	32	30	31
DT8	Roadside	N	24	27	49	31	37
DT9	Roadside	N	26	29	37	34	34
DT10	Roadside	N	N/A	N/A	N/A	25	25
DT11	Roadside	N	N/A	N/A	N/A	38	38
DT12	Roadside	N	31	34	**42**	37	37
DT13	Urban Background	N	14	14	18	15	15

Site ID	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]				
			2008 (Bias Adjustment Factor = 0.88)	2009 (Bias Adjustment Factor = 0.89)	2010 (Bias Adjustment Factor = 1.08)	2011 (Bias Adjustment Factor = 1.04)	2012 (Bias Adjustment Factor = 1.09)
DT14	Roadside	N	20	23	26	25	26
DT15	Roadside	N	N/A	N/A	N/A	N/A	**43**[b]
DT16	Roadside	N	N/A	N/A	N/A	N/A	**42**[b]
DT17	Roadside	N	N/A	N/A	N/A	N/A	35
DT18	Roadside	N	N/A	N/A	N/A	N/A	31[b]
DT19	Roadside	N	N/A	N/A	N/A	N/A	**41**[a]
DT20	Roadside	N	N/A	N/A	N/A	N/A	**45**[a]

In bold, exceedence of the NO$_2$ annual mean AQS objective of 40µg/m^3

Underlined, annual mean > 60µg/m^3, indicating a potential exceedence of the NO$_2$ hourly mean AQS objective

[a] Means should be "annualised" as in Box 3.2 of TG(09) (http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38), if full calendar year data capture is less than 75%

Figure 2.4   Trends in Annual Mean Nitrogen Dioxide Concentrations (bias adjusted) Measured at Roadside Diffusion Tube Monitoring Sites with historic data
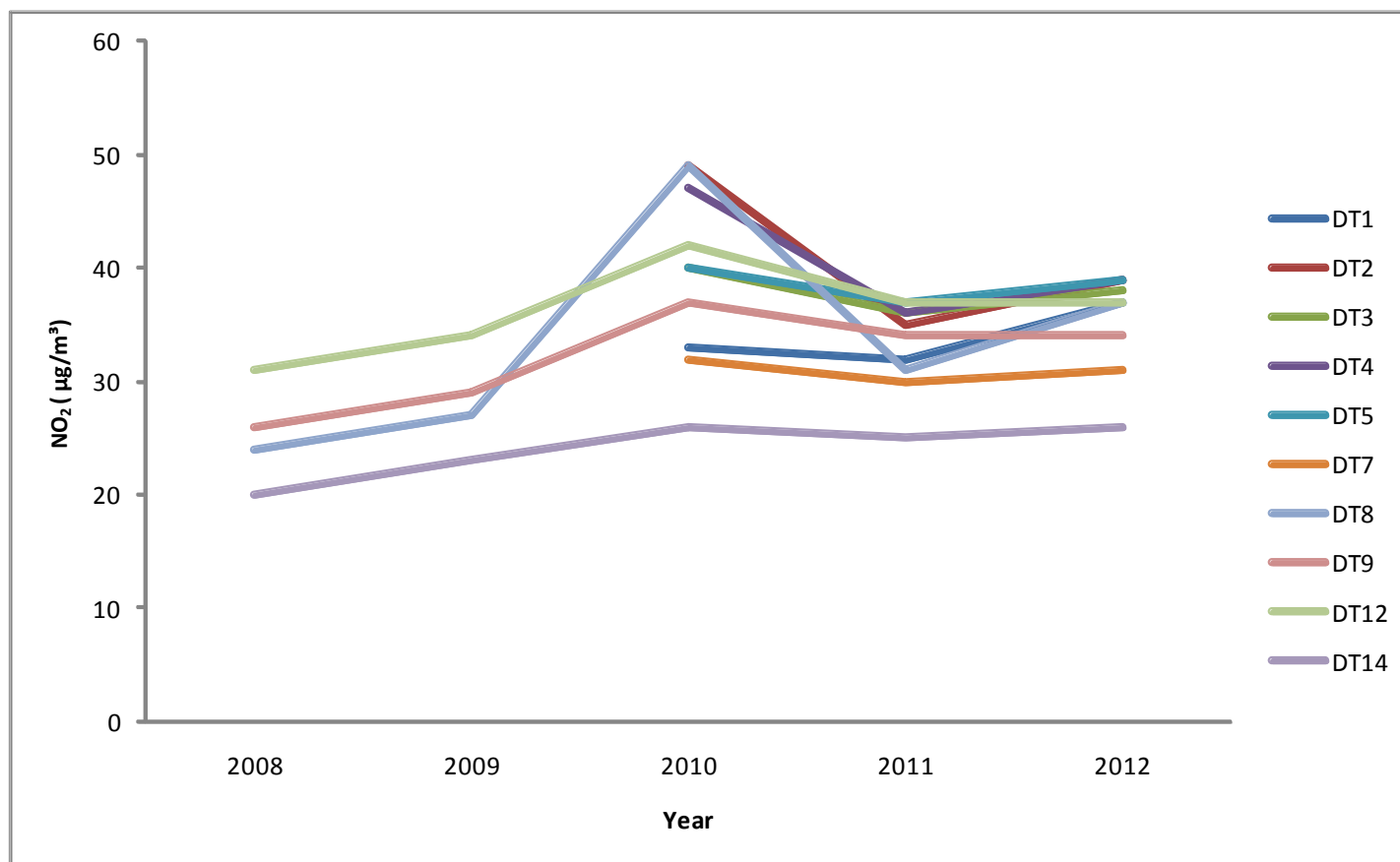
NO_2 annual mean diffusion tube results at roadside locations over the past 5 years are illustrated in Figure 2.4 above. There is a trend showing a general increase in NO_2 concentration from to 2008 to 2012 at most roadside sites.

2.2.1   Particulate Matter (PM$_{10}$)

During 2012 the Council monitored PM$_{10}$ using three real time automatic analysers at four locations. The Groundhog mobile unit at Whitburn Cross was decommissioned on 03/04/12 and a new automatic monitoring site utilising an automatic FDMS analyser was established at Newton from 23/05/12.   The two other FDMS analysers continued to operate at Broxburn East Main Street (CMC) and Linlithgow High Street (Romon 300).

The measured annual mean and 24-hour mean PM$_{10}$ concentrations for 2012 and previous years are presented in **Tables 2.7** and **2.8** respectively.

Table 2.7   Results of Automatic Monitoring for PM$_{10}$: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2012 % [b]	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean Concentration (µg/m^3)				
						2008* [c]	2009* [c]	2010* [c]	2011* [c]	2012 [c]
CM1 Lin	Roadside	N	77	77	Y	16	18	12	13	12
CM2 Brox	Roadside	Y	97	97	Y	16.4	**19**	**21**	18	16
CM3 Whit	Roadside	N	98	25	Y	N/A	N/A	14	13	11.3 [c]
CM4 Newt	Roadside	N	93	56	Y	N/A	N/A	N/A	N/A	14.7 [c]

In bold, exceedence of the PM$_{10}$ annual mean AQS objective of 18µg/m^3

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] Means should be "annualised" as in Box 3.2 of TG(09) (http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38), if valid data capture is less than 75%

* Annual mean concentrations for previous years are optional

Figure 2.5   Trends in Annual Mean PM$_{10}$ Concentrations
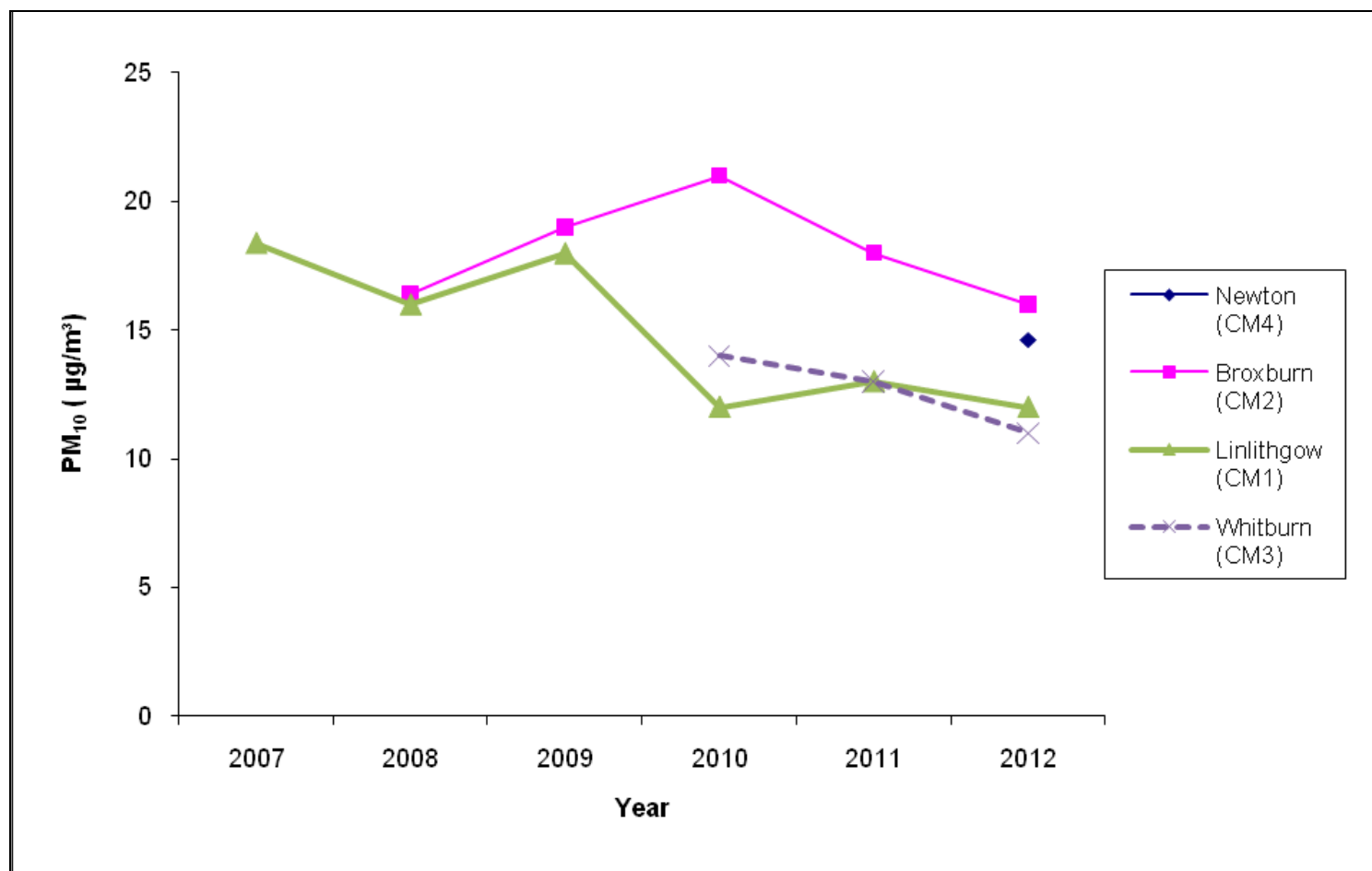
A trend chart providing PM$_{10}$ annual mean results over the past 5 years is illustrated in Figure 2.5. The trend shows a slight reduction at Linlithgow and Whitburn.

Table 2.8   Results of Automatic Monitoring for PM$_{10}$: Comparison with 24-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2012 % [b]	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m^3				
						2008* [c]	2009* [c]	2010* [c]	2011* [c]	2012 [c]
CM1 Lin	Roadside	N	77	77	Y	2 (41)	2	0 (30)	1	1 (35)
CM2 Brox	Roadside	Y	97	97	Y	1 (37)	5	4	3	2
CM3 Whit	Roadside	N	98	25	Y	0	1 (30)	0 (37)	2	1 (41)
CM4 Newt	Roadside	N	93	56	Y	N/A	N/A	N/A	N/A	0 (25)

In bold, exceedence of the PM$_{10}$ daily mean AQS objective (50µg/m^3 – not to be exceeded more than 7 times per year)

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] if data capture for full calendar year is less than 90%, include the 98.1th percentile of 24-hour means in brackets

* Number of exceedences for previous years is optional

2.2.2   Summary of Compliance with AQS Objectives

West Lothian Council has examined the results from monitoring in the district. Concentrations within the AQMA still exceed the annual mean for NO_2 at Broxburn and the AQMA should remain.

Diffusion tubes indicate an exceedence of NO_2 in Linlithgow High Street which will therefore proceed to a Detailed Assessment. There are no other exceedences in West Lothian.

3 New Local Developments

3.1 Road Traffic Sources

There are no new Road Transport Sources

3.2 Other Transport Sources

There are no new Other Road Transport Sources

3.3 Industrial Sources

There are no new Industrial Sources

3.4 Commercial and Domestic Sources

While small domestic solid fuel burning stoves are becoming more popular there are no areas where this has been identified as relevant.

3.5 New Developments with Fugitive or Uncontrolled Sources

A new open cast coal mine at Rusha Farm, south west of West Calder and Addiewell, began initial excavations at the end of 2012. This development is subject to Planning Application 1199/M/07 and associated planning conditions to control any fugitive particle matter emissions.

West Lothian Council has identified the following new or previously unidentified local developments which may impact on air quality in the Local Authority area.

Rusha Farm opencast coal mine

This will be taken into consideration in the next Updating and Screening Assessment

4   Local / Regional Air Quality Strategy

There is no Local/Air Quality Strategy at present.

5   Air Quality Planning Policies

Air quality is explicity mentioned in the following policies and guidance:

- West Lothian Local Plan 2009

However, West Lothian Council does not have a specific policy on Planning and Air Quality.

6 Local Transport Plans and Strategies

West Lothian Council is in the process of producing a new Local Transport Strategy to replace that from the year 2000.

7 Climate Change Strategies

The Council Climate Change Strategy is not yet available.

8 Implementation of Action Plans

The Broxburn Air Quality Management Area action plan process was initiated towards the end of 2012. A Draft Action Plan is being developed.

9   Conclusions and Proposed Actions

9.1   Conclusions from New Monitoring Data

The measured annual mean NO_2 concentration within the Broxburn AQMA in 2012 remained above the annual mean objective level. Measured concentrations at diffusion tube locations within the AQMA were below the annual mean objective level after bias adjustment and distance correction. There were no measured exceedences of the 1-hour objective for NO_2.

No further exceedences of NO_2 objectives were measured at other automatic monitoring stations. Furthermore, there were no measured exceedences of the annual mean NO_2 objective at diffusion tube monitoring sites except Linlithgow High Street which will proceed to a Detailed Assessment.

Broxburn showed NO_2 concentration higher that the previous year but typically, measured NO_2 concentrations in 2012 continued a trend over recent years which showed neither an increase nor decrease. Newton is a new site which only started in May 2012.

Measured PM_{10} concentrations at all automatic sites were below the annual mean objective level. Although Broxburn PM_{10} concentration fell below objective levels the AQMA will remain for PM_{10} with levels reviewed after next years report.

Whilst exceedences of the daily mean PM_{10} objective level were measured at all automatic sites except Newton, the numbers of measured exceedences were below the levels permitted under the NAQS objective level at each site.

9.2   Conclusions relating to New Local Developments

No new sources were identified for which there was a need to proceed to a Detailed Assessment.

9.3   Other Conclusions

The West Lothian Local Plan (2009) identifies core development (CDA) areas as the focus of growth until 2015. This includes considerable planned residential development. Air Quality is an ongoing consideration as CDA development progresses.

9.4   Proposed Actions

No new areas of concern have been identified by the Progress Report except Linlithgow High Street 'canyon' area.

The Linlithgow Air Quality monitoring station will be relocated to the worst case 'canyon' area identified by the Detailed Assessment and approved by the Scottish Government. The Council will continue to monitor using a network of diffusion tube surveys in this area of Linlithgow.

The Council should continue to monitor both NO_2 and PM_{10} within the Broxburn AQMA and proceed with the action planning process.

The Council should prepare an annual Progress Report on monitored pollutant concentrations and progress with the Broxburn Action Plan in 2013.

10   References

1. AEA/ENV/R/2504-Issue 1a – Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance

2. 2011 Air Quality Progress Report for West Lothian Council

3. 2012 Air Quality Updating and Screening Assessment for West Lothian Council

4. Local Air Quality Technical Guidance LAQM.TG(09)

5. West Lothian Local Plan 2009

Appendices

Appendix A: Quality Assurance / Quality Control (QA/QC) Data

Appendix B: Maps

Appendix C: Diffusion Tube Monthly Results

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Due to a change in analyst during 2012, diffusion tube analysis was carried out by 3 different analysts.

Factor from Local Co-location Studies (if available)

Three diffusion tubes have been located adjacent to the inlet of the automatic monitoring station in Broxburn, West Main Street. The results from the diffusion tubes were compared to the results over the same periods from the co-located Thermo 42i NOx analyser.

The results were analysed using the AEA spreadsheet to determine precision, accuracy and to calculate a locally derived bias correction factor as detailed in Appendix C (DT4).

As derived from three different laboratories these co-location results were not included in the national database.

Discussion of Choice of Factor to Use

The analysis of the Broxburn co-location study calculated a locally derived bias factor of 1.09, which was applied to all diffusion tube site data. This local bias correction factor was considered representative of the local situation.

PM Monitoring Adjustment

All PM monitoring data was from FDMS therefore no adjustments were made.

Short-term to Long-term Data adjustment

Two annualisation calculations were necessary for Whitburn and Newton PM_{10}

Table A.1   Short-Term to Long-Term Monitoring Data Adjustment Whitburn

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$) (01/01/12-03/04/12)	Ratio
East Kilbride	Roadside	13	16.7	0.778
Auchencorth Moss	Rural	7	9.7	0.722
Waulkmillglen Reservoir	Rural	11	12	0.917
Average				0.806

Table A.2   Short-Term to Long-Term Monitoring Data Adjustment Newton

Site	Site Type	Annual Mean ($\mu g/m^3$)	Period Mean ($\mu g/m^3$) (01/01/12-03/04/12)	Ratio
East Kilbride	Roadside	13	10.7	1.215
Auchencorth Moss	Rural	7	6.3	1.111
Waulkmillglen Reservoir	Rural	11	10.3	1.068
Average				1.131

Two annualisation calculations were necessary for Whitburn and Newton NO$_2$

Table A.3   Short-Term to Long-Term Monitoring Data Adjustment Whitburn

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3) (01/01/12-03/04/12)	Ratio
Bush Estate	Rural	6.3	5.6	1.125
Eskdalemuir	Rural	3	4.5	0.667
Average				0.896

Table A.4   Short-Term to Long-Term Monitoring Data Adjustment Newton

Site	Site Type	Annual Mean (µg/m^3)	Period Mean (µg/m^3) (23/05/12-31/12/12)	Ratio
Bush Estate	Rural	6.3	6.15	1.024
Eskdalemuir	Rural	3	2.557	1.173
Average				1.099

QA/QC of Automatic Monitoring

The automatic monitoring sites at Linlithgow, Broxburn, Newton and Whitburn were subject to site audits including calibration checks every 6 months. These were carried out by AEA.

Data validation and ratification was carried out by AEA as summarised in the Air Pollution Reports at the end of this Appendix.

Analyser Maintenance and Calibration

Air Monitors Ltd continues to service and provide engineer call-outs to all four sites. Servicing of analysers at all sites is carried out every six months with engineer maintenance visits made as required. Additional regular site visits are made to check

analyser operation and site condition and to change analyser filters. All TEOM/FDMS filters are changed before the filters reach 90%. The TEOM head is cleaned at each filter change.

All three automatic monitoring stations use an Air Monitors web logger. Auto calibrations are run daily at each site for NO_x analysers. Calibration data is monitored using Air Monitors AQ Web Manager and AQ Web Reports software.

Data Acquisition, Security and Dissemination

All sites incorporate a web logger allowing data to be viewed, downloaded and reviewed using the associated software, AQ Web Manager, AQ Web Archive and AQ Web Reports.

All West Lothian Council automatic monitoring site data can be accessed via the Scottish Government Air Quality website at www.scottishairquality.co.uk. AEA validated historic data is available from this site.

QA/QC of Diffusion Tube Monitoring

- West Lothian Council changed diffusion tube supplier/analyst during 2012. This change resulted in diffusion tubes being supplied and analysed by 3 different analysts during 2012. Diffusion tubes were supplied and analysed by Analytical and Scientific Services, Edinburgh City Council, Gradko and the current analyst, ESG Didcot.

- Edinburgh and ESG used 50% v/v Triethanolanine (TEA) in acetone for the absorbant in which grids are dipped then allowed to dry before being inserted into acrylic tubes. Gradko used 20% TEA in water.

- Harmonisation Practical Guidance procedures are followed by these laboratories.

- West Lothian has compared diffusion tube results with that of an automatic NOx analyser in a co-location study at the Broxburn roadside site (see above).

- The bias adjustment factor applied to diffusion tube annual means is 1.09. This was calculated using a local co-location study (see above).

- The laboratories all participated in the Workplace Analysis Scheme for Proficiency (WASP). All three achieved 100% satisfactory for rounds 116 – 119 (January 2012 –December 2012).

West Lothian Council deploys diffusion tubes according to the procedure detailed in guidance document AEA/ENV/R/2504[2] – Issue 1a. Diffusion tubes are exposed on the 4/5 week cycle specified in the AEA calendar and are stored in a sealed container in a refrigerator until being returned to the laboratory. Travel blank diffusion tubes are carried throughout the deployment and analysis procedure.

Produced by Ricardo-AEA on behalf of the Scottish Government

WEST LOTHIAN LINLITHGOW HIGH STREET
1st January to 31st December 2012

These data have been fully ratified by Ricardo-AEA

POLLUTANT	PM$_{10}$*	NO$_2$	NO$_X$
Maximum hourly mean	80 µg m^{-3}	145 µg m^{-3}	632 µg m^{-3}
Maximum daily mean	54 µg m^{-3}	80 µg m^{-3}	278 µg m^{-3}
98.08th percentile of daily means	35 µg m^{-3}	-	-
Average	12 µg m^{-3}	18 µg m^{-3}	35 µg m^{-3}
Data capture	76.6 %	99.1 %	99.1 %

* PM$_{10}$ as measured by a FDMS using a gravimetric factor of 1
All gaseous pollutant mass units are at 20°C and 1013 mb. Particulate matter concentrations are reported at ambient temperature and pressure.
NO$_X$ mass units are NO$_X$ as NO$_2$ µg m^{-3}

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM$_{10}$ Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	1	1
PM$_{10}$ Particulate Matter (Gravimetric)	Annual mean > 18 µg m^{-3}	0	-
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Produced by Ricardo-AEA on behalf of the Scottish Government

West Lothian Linlithgow High Street
Hourly Mean Data for 1st January to 31st December 2012
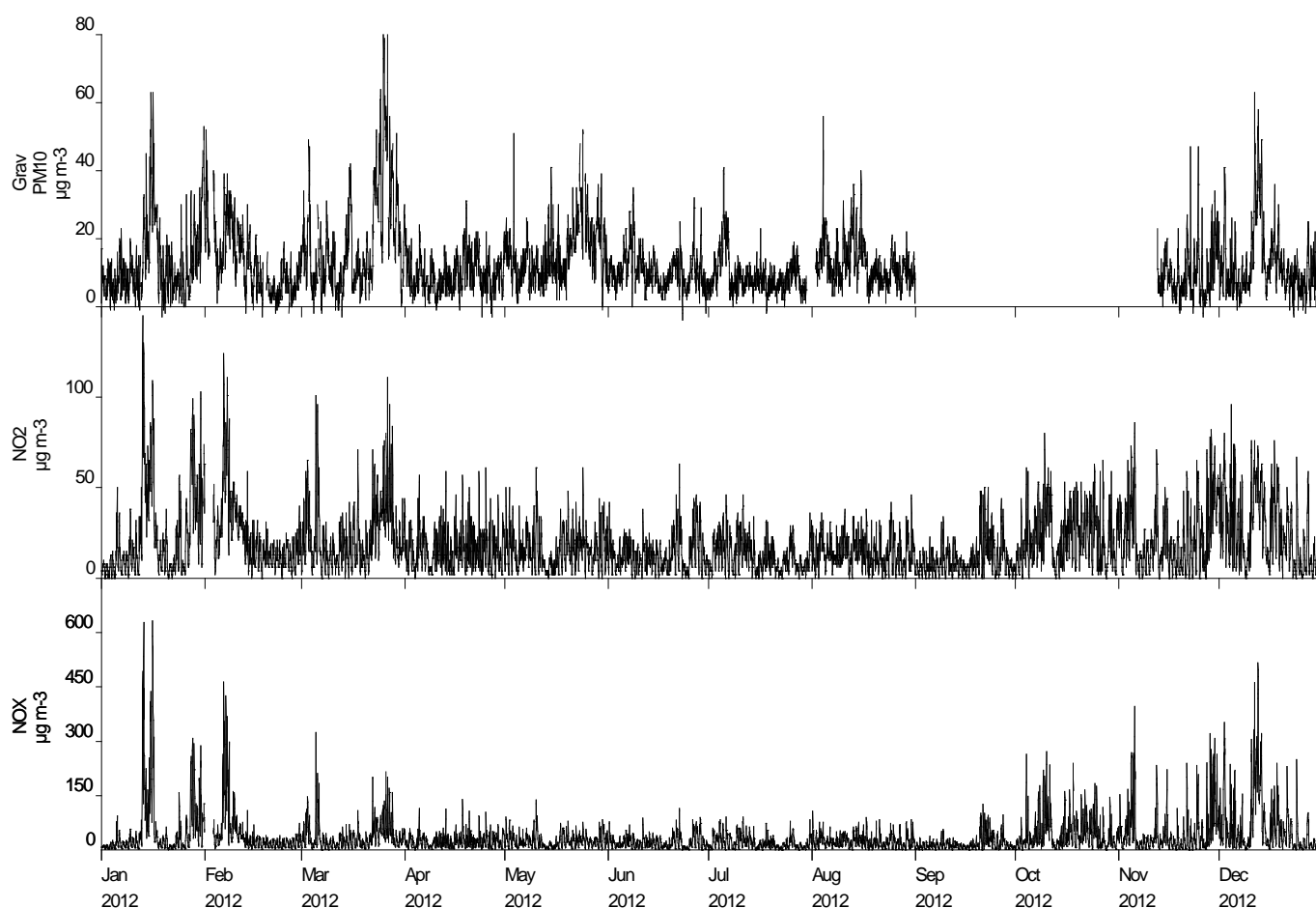
Date Created: 22/03/2013

Produced by Ricardo-AEA on behalf of the Scottish Government

WEST LOTHIAN BROXBURN
1st January to 31st December 2012

These data have been fully ratified by Ricardo-AEA

POLLUTANT	PM$_{10}$*	NO$_2$	NO$_X$
Maximum hourly mean	511 µg m^{-3}	197 µg m^{-3}	881 µg m^{-3}
Maximum daily mean	67 µg m^{-3}	96 µg m^{-3}	450 µg m^{-3}
Average	16 µg m^{-3}	45 µg m^{-3}	117 µg m^{-3}
Data capture	96.6 %	97.2 %	97.2 %

+ PM$_{10}$ instruments:
   FDMS using a gravimetric factor of 1 from 1st January 2012
All gaseous pollutant mass units are at 20°C and 1013 mb. Particulate matter concentrations are reported at ambient temperature and pressure.
NO$_X$ mass units are NO$_X$ as NO$_2$ µg m^{-3}

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM$_{10}$ Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	2	2
PM$_{10}$ Particulate Matter (Gravimetric)	Annual mean > 18 µg m^{-3}	0	-
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	1	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Produced by Ricardo-AEA on behalf of the Scottish Government

West Lothian Broxburn
Hourly Mean Data for 1ˢᵗ January to 31ˢᵗ December 2012
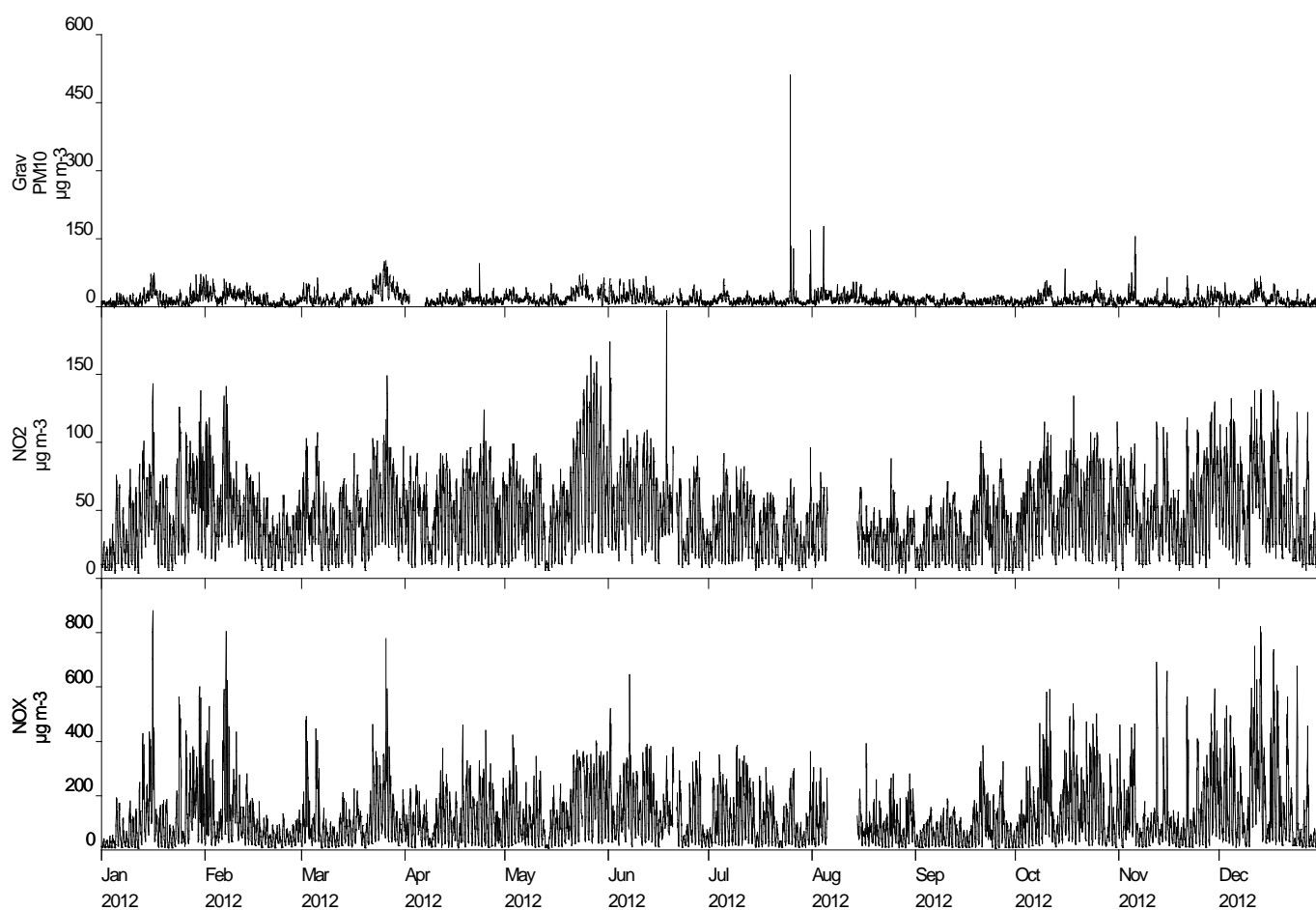
Date Created: 22/03/2013

Produced by Ricardo-AEA on behalf of the Scottish Government

WEST LOTHIAN WHITBURN
1st January to 31st December 2012

These data have been fully ratified by Ricardo-AEA

POLLUTANT	PM_{10}*	NO_2	NO_X
Maximum hourly mean	103 µg m^{-3}	84 µg m^{-3}	680 µg m^{-3}
Maximum daily mean	51 µg m^{-3}	50 µg m^{-3}	265 µg m^{-3}
99.8th percentile of hourly means	-	78 µg m^{-3}	-
98.08th percentile of daily means	41 µg m^{-3}	-	-
Average	14 µg m^{-3}	21 µg m^{-3}	40 µg m^{-3}
Data capture	25.3 %	25.5 %	25.5 %

* PM_{10} instruments:
   FDMS using a gravimetric factor of 1 from 1st January 2012 to 3rd April 2012
All gaseous pollutant mass units are at 20°C and 1013 mb. Particulate matter concentrations are reported at ambient temperature and pressure.
NO_X mass units are NO_X as NO_2 µg m^{-3}

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM_{10} Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	1	1
PM_{10} Particulate Matter (Gravimetric)	Annual mean > 18 µg m^{-3}	0	-
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Produced by Ricardo-AEA on behalf of the Scottish Government

**West Lothian Whitburn
Hourly Mean Data for 1st January to 31st December 2012**
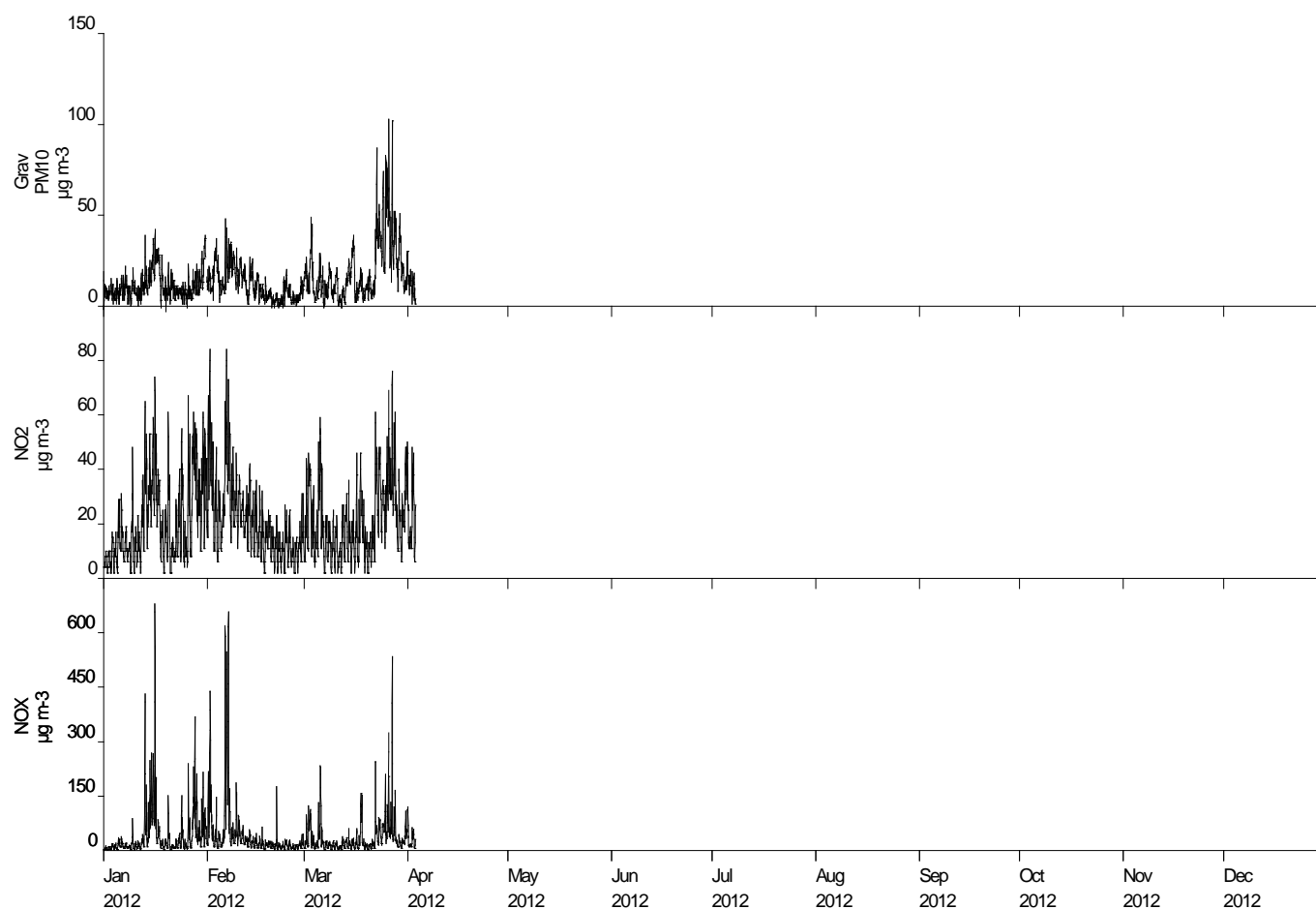
Date Created: 22/03/2013

Produced by Ricardo-AEA on behalf of the Scottish Government

WEST LOTHIAN NEWTON
1st January to 31st December 2012

These data have been fully ratified by Ricardo-AEA

POLLUTANT	PM$_{10}$*	NO$_2$	NO$_X$
Maximum hourly mean	123 µg m^{-3}	183 µg m^{-3}	686 µg m^{-3}
Maximum daily mean	39 µg m^{-3}	101 µg m^{-3}	342 µg m^{-3}
99.8th percentile of hourly means	-	147 µg m^{-3}	-
98.08th percentile of daily means	25 µg m^{-3}	-	-
Average	13 µg m^{-3}	29 µg m^{-3}	69 µg m^{-3}
Data capture	56.0 %	60.5 %	60.5 %

+ PM$_{10}$ instruments:
   FDMS using a gravimetric factor of 1 from 23rd May 2012
All gaseous pollutant mass units are at 20°C and 1013 mb. Particulate matter concentrations are reported at ambient temperature and pressure.
NO$_X$ mass units are NO$_X$ as NO$_2$ µg m^{-3}

Pollutant	Air Quality Regulations (2000) and Air Quality (Scotland) Amendment Regulations 2002	Exceedences	Days
PM$_{10}$ Particulate Matter (Gravimetric)	Daily mean > 50 µg m^{-3}	0	0
PM$_{10}$ Particulate Matter (Gravimetric)	Annual mean > 18 µg m^{-3}	0	-
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0

Note: For a strict comparison against the objectives there must be a data capture of >90% throughout the calendar year

Produced by Ricardo-AEA on behalf of the Scottish Government

West Lothian Newton
Hourly Mean Data for 1st January to 31st December 2012
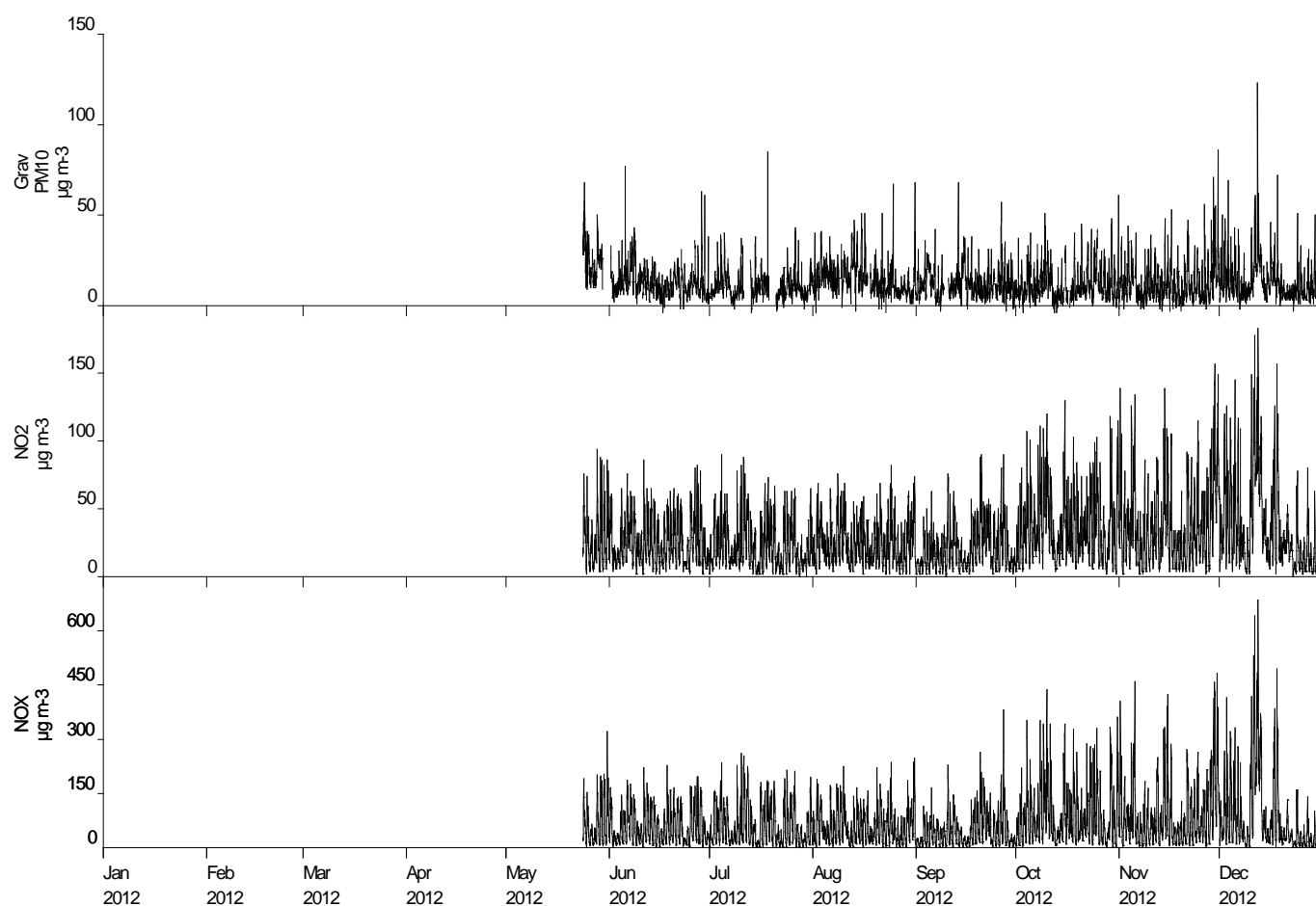
Date Created: 22/03/2013

Appendix B: Maps

Figure 2.1
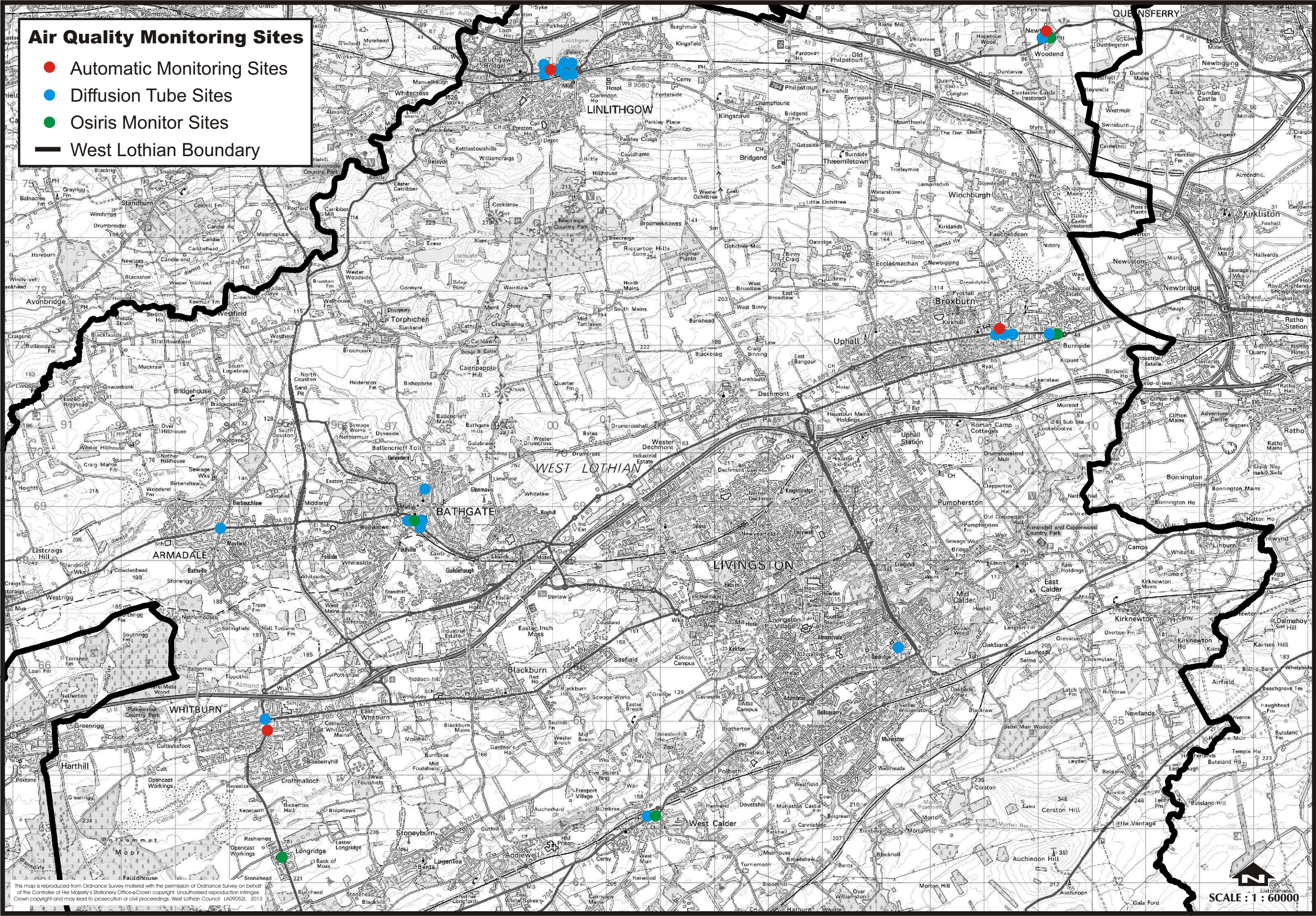
Air Quality Monitoring Sites

- 🔴 Automatic Monitoring Sites
- 🔵 Diffusion Tube Sites
- 🟢 Osiris Monitor Sites
- — West Lothian Boundary

SCALE : 1 : 60000

Figure 1.1

BROXBURN AIR QUALITY MANAGEMENT AREA 2011

AIR QUALITY MANAGEMENT AREA

0   0.25km   0.5km

0.25miles   0.5miles

Scale : 1 : 8000
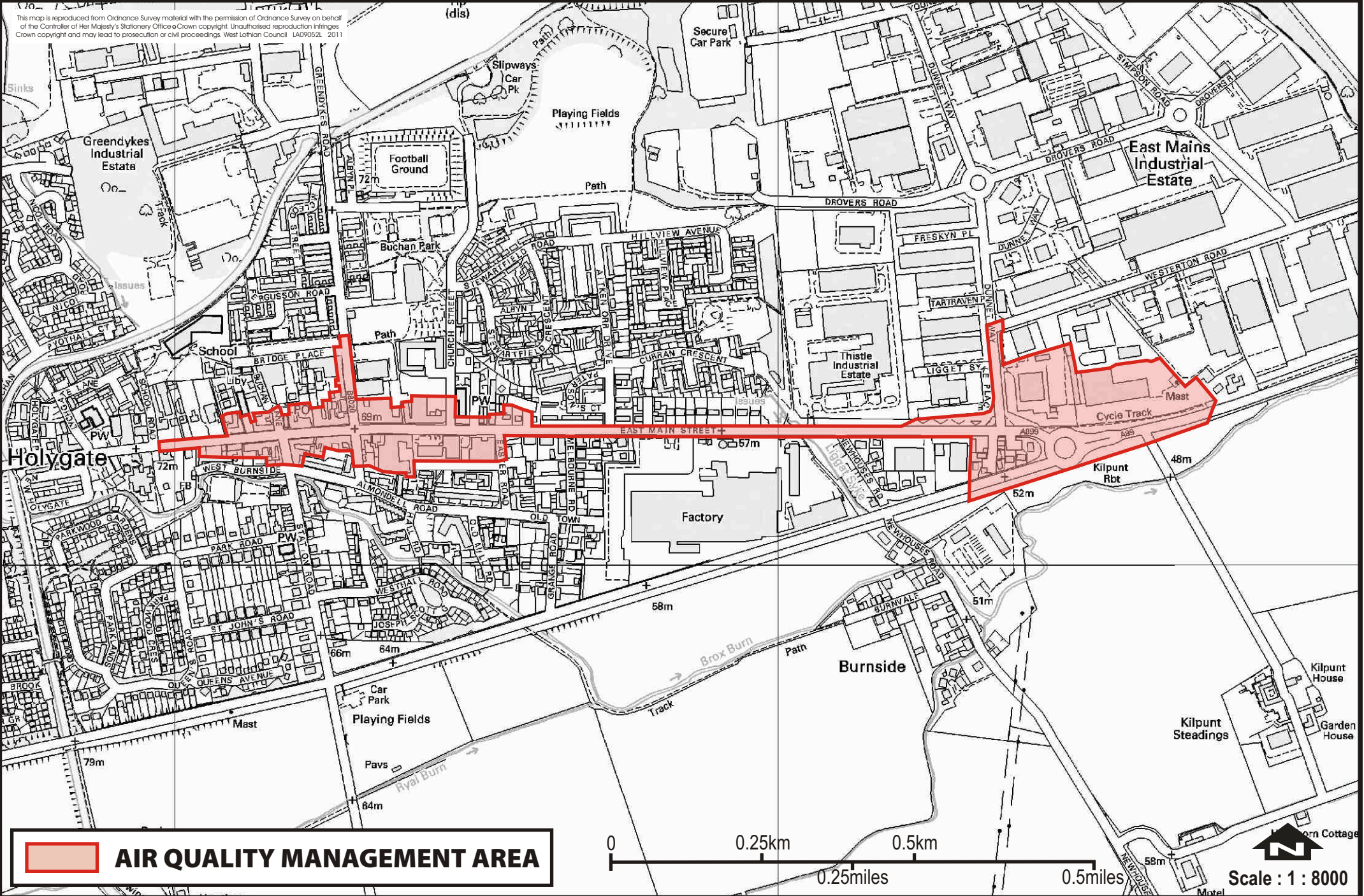
Appendix C: Full Diffusion Tube Site Data

Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment
From the AEA group

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012	36.8	35.7		36.3	0.78	2.15	6.99	Good
2	01/02/2013	29/02/13	37.9	42.4		40.2	3.18	7.93	28.59	Good
3	29/02/2012	27/03/2012	32.3	36.7		34.5	3.11	9.01	27.95	Good
4	27/03/2012	26/04/2012	36.9	34.6		35.7	1.62	4.53	14.55	Good
5	26/04/2012	29/05/2012	19.0	17.6		18.3	0.99	5.41	8.89	Good
6	29/05/2012	26/06/2012	24.8	25.9		25.4	0.76	3.01	6.86	Good
7	26/06/2012	31/07/2012	24.5	24.4		24.5	0.09	0.38	0.83	Good
8	31/07/2012	28/08/2012	29.2	36.1		32.7	4.88	14.94	43.84	Good
9	28/08/2012	26/09/2012	31.5	27.5		29.5	2.83	9.59	25.41	Good
10	26/09/2012	30/10/2012	41.5	40.7		41.1	0.57	1.38	5.08	Good
11	30/10/2012	28/11/2012	38.5	38.6		38.6	0.07	0.18	0.64	Good
12	28/11/2012	04/01/2013	48.0	43.4		45.7	3.25	7.12	29.22	Good
13										

Diffusion Tubes Measurements — **Data Quality Check**

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Site Name/ ID: **DT1 Newton**

Version 04 - February 2011

Adjusted measurement   (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
  Bias factor A: 1.09 (0.94 - 1.29)
      Bias B: -8%   (-22% - 6%)
Information about tubes to be adjusted
  Diffusion Tube average: 34 μgm^{-3}
  Average Precision (CV):   5
  Adjusted Tube average: 37 +/- 9 μgm^{-3}

Adjusted measurement   (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
  Bias factor A: 1.11 (0.97 - 1.31)
      Bias B: -10%   (-24% - 4%)
Information about tubes to be adjusted
  Diffusion Tube average: 34 μgm^{-3}
  Average Precision (CV):   5
  Adjusted Tube average: 37 +/- 9 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
				Diffusion Tubes Measurements						**Data Quality Check**
1	06/01/2012	01/02/2012	42.2	39.5		40.9	1.91	4.67	17.15	Good
2	01/02/2013	29/02/13	38.4	37.3		37.9	0.78	2.05	6.99	Good
3	29/02/2012	27/03/2012	34.3	34.6		34.4	0.20	0.58	1.78	Good
4	27/03/2012	26/04/2012	40.2	35.7		37.9	3.19	8.41	28.65	Good
5	26/04/2012	29/05/2012	25.1	25.2		25.2	0.07	0.28	0.64	Good
6	29/05/2012	26/06/2012	29.8	27.8		28.8	1.46	5.08	13.15	Good
7	26/06/2012	31/07/2012	25.8	23.6		24.7	1.53	6.19	13.72	Good
8	31/07/2012	28/08/2012	32.9	28.6		30.8	3.04	9.89	27.32	Good
9	28/08/2012	26/09/2012	29.1	Missing						
10	26/09/2012	30/10/2012	39.1	42.7		40.9	2.55	6.22	22.87	Good
11	30/10/2012	28/11/2012	35.2	45.1		40.2	7.00	17.44	62.90	Good
12	28/11/2012	04/01/2013	52.2	49.4		50.8	1.98	3.90	17.79	Good
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID:	**DT2 Broxburn WMS**

Jaume Targa, for AEA

Version 04 - February 2011

Adjusted measurement   (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
 Tube Precision: 5   Automatic DC: 100%
   Bias factor A: 1.09 (0.94 - 1.29)
       Bias B: -8% (-22% - -6%)

Information about tubes to be adjusted
 Diffusion Tube average: 36 μgm^{-3}
 Average Precision (CV):   6
 Adjusted Tube average: 39 +/- 10 μgm^{-3}

Adjusted measurement   (95% confidence level)
with all data
Bias calculated using 12 periods of data
 Tube Precision: 8   Automatic DC: 100%
   Bias factor A: 1.11 (0.97 - 1.31)
       Bias B: -10%   (-24% - -4%)

Information about tubes to be adjusted
 Diffusion Tube average: 36 μgm^{-3}
 Average Precision (CV):   6
 Adjusted Tube average: 40 +/- 9 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	06/01/2012	01/02/2012	39.9	42.2		41.1	1.63	3.96	14.61
2	01/02/2013	29/02/13	44.3	41.9		43.1	1.70	3.94	15.25
3	29/02/2012	27/03/2012	37.3	38.3		37.8	0.71	1.87	6.35
4	27/03/2012	26/04/2012	36.5	39.1		37.8	1.83	4.85	16.45
5	26/04/2012	29/05/2012	23.1	17.9		20.5	3.68	17.94	33.04
6	29/05/2012	26/06/2012	24.8	24.6		24.7	0.18	0.72	1.59
7	26/06/2012	31/07/2012	23.5	22.5		23.0	0.69	2.98	6.16
8	31/07/2012	28/08/2012	28.0	28.2		28.1	0.14	0.50	1.27
9	28/08/2012	26/09/2012	29.6	29.1		29.4	0.35	1.20	3.18
10	26/09/2012	30/10/2012	41.3	42.8		42.1	1.06	2.52	9.53
11	30/10/2012	28/11/2012	38.3	29.1		33.7	6.51	19.30	58.45
12	28/11/2012	04/01/2013	49.8	55.8		52.8	4.24	8.04	38.12
13									

Data Quality Check

Diffusion Tubes Precision Check

Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ID: **DT3 Broxburn EMS**

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8% (-22% - 6%)

Information about tubes to be adjusted
Diffusion Tube average: 34 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: 38 +/- 9 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10% (-24% - 4%)

Information about tubes to be adjusted
Diffusion Tube average: 34 μgm^{-3}
Average Precision (CV): 6
Adjusted Tube average: 38 +/- 9 μgm^{-3}

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean		Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
	Diffusion Tubes Measurements										**Automatic Method**		**Data Quality Check**	
1	06/01/2012	01/02/2012	43.7	46.1	47.4	46	1.9	4	4.7		48.1	100	Good	Good
2	01/02/2013	29/02/13	41.5	45.9	43.5	44	2.2	5	5.5		42.7	100	Good	Good
3	29/02/2012	27/03/2012	40.7	46.4	43.4	44	2.9	7	7.1		45.4	100	Good	Good
4	27/03/2012	26/04/2012	51.1	43.3	38.1	44	6.5	15	16.3		48.6	100	Good	Good
5	26/04/2012	29/05/2012	24.0	24.8	26.8	25	1.4	6	3.6		54	100	Good	Good
6	29/05/2012	26/06/2012	39.3	36.9	35.6	37	1.9	5	4.7		56	100	Good	Good
7	26/06/2012	31/07/2012	33.6	33.1	35.7	34	1.4	4	3.4		35	100	Good	Good
8	31/07/2012	28/08/2012	40.5	35.9	38.0	38	2.3	6	5.7		32	100	Good	Good
9	28/08/2012	26/09/2012	37.9	36.4	35.1	36	1.4	4	3.5		32	100	Good	Good
10	26/09/2012	30/10/2012	51.7	51.0	54.3	52	1.7	3	4.3		48	100	Good	Good
11	30/10/2012	28/11/2012	17.4	40.1	40.3	33	13.2	40	32.7		46.2	100	Poor Precision	Good
12	28/11/2012	04/01/2013	53.1	53.8	52.0	53	0.9	2	2.3		52	100	Good	Good
13														

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey --> | Good precision | Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	DT 4 Broxburn CNC

Precision   11 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 11 periods of data
Bias factor A   1.09 (0.94 - 1.29)
Bias B   -8% (-22% - 6%)
Diffusion Tubes Mean: 41 μgm^{-3}
Mean CV (**Precision**):   5
Automatic Mean: 45 μgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 45 (39 - 53) μgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A   1.11 (0.97 - 1.31)
Bias B   -10% (-24% - 4%)
Diffusion Tubes Mean: 41 μgm^{-3}
Mean CV (**Precision**):   8
Automatic Mean: 45 μgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 45 (39 - 53) μgm^{-3}
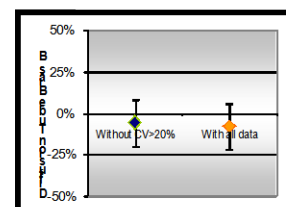
Jaume Targa, for AEA
Version 04 - February 2011

Adjustment of DUPLICATE or TRIPLICATE Tubes — AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check — Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012	39.8	40.5		40.2	0.49	1.23	4.45	Good
2	01/02/2013	29/02/13	28.2	34.3		31.3	4.31	13.80	38.75	Good
3	29/02/2012	27/03/2012	34.7	31.5		33.1	2.26	6.82	20.27	Good
4	27/03/2012	26/04/2012	43.7	39.9		41.8	2.70	6.46	24.27	Good
5	26/04/2012	29/05/2012	25.5	25.7		25.6	0.14	0.55	1.27	Good
6	29/05/2012	26/06/2012	41.3	41.6		41.5	0.25	0.60	2.22	Good
7	26/06/2012	31/07/2012	32.5	32.8		32.7	0.19	0.58	1.72	Good
8	31/07/2012	28/08/2012	35.2	30.9		33.1	3.04	9.20	27.32	Good
9	28/08/2012	26/09/2012	28.1	31.1		29.6	2.12	7.17	19.06	Good
10	26/09/2012	30/10/2012	42.9	46.9		44.9	2.83	6.30	25.41	Good
11	30/10/2012	28/11/2012	31.3	34.8		33.1	2.47	7.49	22.24	Good
12	28/11/2012	04/01/2013	48.2	45.4		46.8	1.98	4.23	17.79	Good
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: **DT5 Broxburn E Mains Ind Est**

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%	Adjusted measurement (95% confidence level) with all data
Bias calculated using 11 periods of data	Bias calculated using 12 periods of data
Tube Precision: 5 Automatic DC: 100%	Tube Precision: 8 Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)	Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -8% (-22% - 6%)	Bias B: -10% (-24% - 4%)
Information about tubes to be adjusted	*Information about tubes to be adjusted*
Diffusion Tube average: 36 μgm^{-3}	Diffusion Tube average: 36 μgm^{-3}
Average Precision (CV): 5	Average Precision (CV): 5
Adjusted Tube average: 39 +/- 10 μgm^{-3}	Adjusted Tube average: 40 +/- 9 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environmen
From the AEA group

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012	19.9	22.2		21.1	1.63	7.73	14.61	Good
2	01/02/2013	29/02/13	17.7	21.4		19.6	2.62	13.38	23.51	Good
3	29/02/2012	27/03/2012	17.9	19.2		18.5	0.96	5.19	8.64	Good
4	27/03/2012	26/04/2012	17.4	15.7		16.6	1.20	7.25	10.80	Good
5	26/04/2012	29/05/2012	12.2	10.4		11.3	1.27	11.26	11.44	Good
6	29/05/2012	26/06/2012	11.0	10.3		10.6	0.49	4.66	4.45	Good
7	26/06/2012	31/07/2012	10.1	10.3		10.2	0.11	1.04	0.95	Good
8	31/07/2012	28/08/2012	14.2	12.5		13.4	1.20	9.00	10.80	Good
9	28/08/2012	26/09/2012	17.2	11.9		14.6	3.75	25.76	33.67	Poor Precision
10	26/09/2012	30/10/2012	24.4	21.7		23.1	1.91	8.28	17.15	Good
11	30/10/2012	28/11/2012	15.3	18.3		16.8	2.12	12.63	19.06	Good
12	28/11/2012	04/01/2013	28.4	26.6		27.5	1.27	4.63	11.44	Good
13										

Diffusion Tubes Measurements

Data Quality Check

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID:	DT6 Dedridge

Jaume Targa, for AEA

Version 04 - February 2011

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
   Bias factor A: 1.09 (0.94 - 1.29)
      Bias B: -8%   (-22% - 6%)
Information about tubes to be adjusted
   Diffusion Tube average: 17 μgm^{-3}
   Average Precision (CV):   8
   Adjusted Tube average: 19 +/- 5 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
   Bias factor A: 1.11 (0.97 - 1.31)
      Bias B: -10%   (-24% - 4%)
Information about tubes to be adjusted
   Diffusion Tube average: 17 μgm^{-3}
   Average Precision (CV):   9
   Adjusted Tube average: 19 +/- 5 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012	30.4	25.1		27.8	3.75	13.51	33.67	Good
2	01/02/2013	29/02/13	30.2	28.9		29.6	0.92	3.11	8.26	Good
3	29/02/2012	27/03/2012	26.8	27.3		27.1	0.30	1.10	2.67	Good
4	27/03/2012	26/04/2012	30.1	30.9		30.5	0.62	2.04	5.59	Good
5	26/04/2012	29/05/2012	22.0	19.9		21.0	1.48	7.09	13.34	Good
6	29/05/2012	26/06/2012	26.2	29.2		27.7	2.13	7.70	19.12	Good
7	26/06/2012	31/07/2012	22.8	25.5		24.1	1.87	7.76	16.84	Good
8	31/07/2012	28/08/2012	24.8	27.7		26.3	2.05	7.81	18.42	Good
9	28/08/2012	26/09/2012	26.0	26.3		26.2	0.21	0.81	1.91	Good
10	26/09/2012	30/10/2012	42.0	33.6		37.8	5.94	15.71	53.37	Good
11	30/10/2012	28/11/2012	25.3	27.9		26.6	1.84	6.91	16.52	Good
12	28/11/2012	04/01/2013	28.4	34.4		31.4	4.24	13.51	38.12	Good
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ID: DT7 West Calder

Adjusted measurement (95% confidence level) Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8% (-22% - 6%)
Information about tubes to be adjusted
Diffusion Tube average: 28 μgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: 31 +/- 8 μgm^{-3}

Adjusted measurement (95% confidence level) with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10% (-24% - 4%)
Information about tubes to be adjusted
Diffusion Tube average: 28 μgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: 31 +/- 7 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes   AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012	36.3	31.5		33.9	3.39	10.01	30.49	Good
2	01/02/2013	29/02/13	36.0	35.9		36.0	0.07	0.20	0.64	Good
3	29/02/2012	27/03/2012	37.0	34.4		35.7	1.80	5.05	16.20	Good
4	27/03/2012	26/04/2012	37.4	38.6		38.0	0.87	2.29	7.81	Good
5	26/04/2012	29/05/2012	27.0	26.9		27.0	0.07	0.26	0.64	Good
6	29/05/2012	26/06/2012	24.7	24.7		24.7	0.01	0.06	0.13	Good
7	26/06/2012	31/07/2012	21.9	22.8		22.4	0.63	2.81	5.65	Good
8	31/07/2012	28/08/2012	28.5	27.9		28.2	0.42	1.50	3.81	Good
9	28/08/2012	26/09/2012	Missing	Missing						
10	26/09/2012	30/10/2012	43.7	41.5		42.6	1.56	3.65	13.98	Good
11	30/10/2012	28/11/2012	33.7	31.7		32.7	1.41	4.32	12.71	Good
12	28/11/2012	04/01/2013	51.7	47.8		49.8	2.76	5.54	24.78	Good
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ ID: DT8 Whitburn Cross

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8% (-22% - 6%)
Information about tubes to be adjusted
Diffusion Tube average: 34 μgm^{-3}
Average Precision (CV): 3
Adjusted Tube average: 37 +/- 9 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10% (-24% - 4%)
Information about tubes to be adjusted
Diffusion Tube average: 34 μgm^{-3}
Average Precision (CV): 3
Adjusted Tube average: 37 +/- 9 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 $\mu g m^{-3}$	Tube 2 $\mu g m^{-3}$	Tube 3 $\mu g m^{-3}$	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
										Data Quality Check
1	06/01/2012	01/02/2012	41.6	34.2		37.9	5.23	13.81	47.01	Good
2	01/02/2013	29/02/13	41.4	38.6		40.0	1.98	4.95	17.79	Good
3	29/02/2012	27/03/2012	36.3	35.7		36.0	0.40	1.10	3.56	Good
4	27/03/2012	26/04/2012	28.0	28.5		28.2	0.40	1.43	3.62	Good
5	26/04/2012	29/05/2012	13.7	13.3		13.5	0.28	2.10	2.54	Good
6	29/05/2012	26/06/2012	21.9	19.1		20.5	1.99	9.71	17.85	Good
7	26/06/2012	31/07/2012	19.2	21.8		20.5	1.83	8.93	16.45	Good
8	31/07/2012	28/08/2012	27.8	27.6		27.7	0.14	0.51	1.27	Good
9	28/08/2012	26/09/2012	32.2	32.1		32.2	0.07	0.22	0.64	Good
10	26/09/2012	30/10/2012	44.0	39.7		41.9	3.04	7.27	27.32	Good
11	30/10/2012	28/11/2012	29.3	38.8		34.1	6.72	19.73	60.35	Good
12	28/11/2012	04/01/2013	51.9	41.6		46.8	7.28	15.58	65.44	Good
13										

Diffusion Tubes Measurements

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ID: **DT9 Armadale Cross**

Adjusted measurement   (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8%   (-22% - 6%)

Information about tubes to be adjusted
Diffusion Tube average: 32 $\mu g m^{-3}$
Average Precision (CV):   7
Adjusted Tube average: 34 +/- 9 $\mu g m^{-3}$

Adjusted measurement   (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10%   (-24% - 4%)

Information about tubes to be adjusted
Diffusion Tube average: 32 $\mu g m^{-3}$
Average Precision (CV):   7
Adjusted Tube average: 35 +/- 8 $\mu g m^{-3}$

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check / Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012	28.7	29.1		28.9	0.28	0.98	2.54	Good
2	01/02/2013	29/02/13	19.5	23.9		21.7	3.11	14.34	27.95	Good
3	29/02/2012	27/03/2012	24.6	25.6		25.1	0.70	2.79	6.29	Good
4	27/03/2012	26/04/2012	26.8	24.8		25.8	1.41	5.46	12.64	Good
5	26/04/2012	29/05/2012	15.0	15.3		15.2	0.21	1.40	1.91	Good
6	29/05/2012	26/06/2012	15.2	14.6		14.9	0.40	2.66	3.56	Good
7	26/06/2012	31/07/2012	14.3	13.9		14.1	0.28	1.96	2.48	Good
8	31/07/2012	28/08/2012	25.6	19.5		22.6	4.31	19.13	38.75	Good
9	28/08/2012	26/09/2012	19.7	19.0		19.4	0.49	2.56	4.45	Good
10	26/09/2012	30/10/2012	30.3	29.8		30.1	0.35	1.18	3.18	Good
11	30/10/2012	28/11/2012	23.0	27.1		25.1	2.90	11.57	26.05	Good
12	28/11/2012	04/01/2013	38.3	36.2		37.3	1.48	3.99	13.34	Good
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ID: DT10 Bathgate S Bridge St

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8%   (-22% - 6%)

Information about tubes to be adjusted
Diffusion Tube average: 23 μgm^{-3}
Average Precision (CV):   6
Adjusted Tube average: 25 +/- 6 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10%   (-24% - 4%)

Information about tubes to be adjusted
Diffusion Tube average: 23 μgm^{-3}
Average Precision (CV):   6
Adjusted Tube average: 26 +/- 6 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean
1	06/01/2012	01/02/2012	43.9	43.8		43.9	0.07	0.16	0.64
2	01/02/2013	29/02/13	39.5	41.8		40.7	1.63	4.00	14.61
3	29/02/2012	27/03/2012	40.6	35.3		37.9	3.78	9.96	33.93
4	27/03/2012	26/04/2012	35.3	36.8		36.0	1.08	3.00	9.72
5	26/04/2012	29/05/2012	19.4	19.6		19.5	0.14	0.73	1.27
6	29/05/2012	26/06/2012	23.0	22.9		22.9	0.11	0.46	0.95
7	26/06/2012	31/07/2012	22.6	24.1		23.4	1.05	4.51	9.47
8	31/07/2012	28/08/2012	27.3	34.5		30.9	5.09	16.48	45.74
9	28/08/2012	26/09/2012	31.5	30.7		31.1	0.57	1.82	5.08
10	26/09/2012	30/10/2012	42.8	41.2		42.0	1.13	2.69	10.16
11	30/10/2012	28/11/2012	43.8	42.2		43.0	1.13	2.63	10.16
12	28/11/2012	04/01/2013	52.4	46.1		49.3	4.45	9.05	40.02
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Data Quality Check

Diffusion Tubes Precision Check

Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good
Good

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ID: DT11 Bathgate Steelyard

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8% (-22% - 6%)

Information about tubes to be adjusted
Diffusion Tube average: 35 μgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 38 +/- 9 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10% (-24% - 4%)

Information about tubes to be adjusted
Diffusion Tube average: 35 μgm^{-3}
Average Precision (CV): 5
Adjusted Tube average: 39 +/- 9 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012	35.5	36.3		35.9	0.57	1.58	5.08	Good
2	01/02/2013	29/02/13	35.4	31.7		33.6	2.62	7.80	23.51	Good
3	29/02/2012	27/03/2012	29.0	33.6		31.3	3.23	10.33	29.03	Good
4	27/03/2012	26/04/2012	36.6	38.7		37.6	1.51	4.02	13.60	Good
5	26/04/2012	29/05/2012	19.6	20.1		19.9	0.35	1.78	3.18	Good
6	29/05/2012	26/06/2012	24.8	25.6		25.2	0.54	2.16	4.89	Good
7	26/06/2012	31/07/2012	25.3	24.1		24.7	0.86	3.47	7.69	Good
8	31/07/2012	28/08/2012	34.1	32.5		33.3	1.13	3.40	10.16	Good
9	28/08/2012	26/09/2012	29.9	30.9		30.4	0.71	2.33	6.35	Good
10	26/09/2012	30/10/2012	48.7	46.7		47.7	1.41	2.96	12.71	Good
11	30/10/2012	28/11/2012	42.9	35.0		39.0	5.59	14.34	50.19	Good
12	28/11/2012	04/01/2013	46.8	61.4		54.1	10.32	19.08	92.76	Good
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ID: **DT12 Bathgate King St**

Adjusted measurement   (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8%   (-22% - 6%)

Information about tubes to be adjusted
Diffusion Tube average: 34 μgm^{-3}
Average Precision (CV):   6
Adjusted Tube average: 37 +/- 9 μgm^{-3}

Adjusted measurement   (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10%   (-24% - 4%)

Information about tubes to be adjusted
Diffusion Tube average: 34 μgm^{-3}
Average Precision (CV):   6
Adjusted Tube average: 38 +/- 9 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check — Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012	23.1	23.8		23.5	0.49	2.11	4.45	Good
2	01/02/2013	29/02/13	20.9	17.9		19.4	2.12	10.93	19.06	Good
3	29/02/2012	27/03/2012	17.4	15.7		16.5	1.20	7.28	10.80	Good
4	27/03/2012	26/04/2012	12.5	12.8		12.6	0.16	1.29	1.46	Good
5	26/04/2012	29/05/2012	6.4	6.8		6.6	0.28	4.29	2.54	Good
6	29/05/2012	26/06/2012	7.0	6.3		6.6	0.51	7.67	4.57	Good
7	26/06/2012	31/07/2012	7.3	5.0		6.1	1.61	26.16	14.42	Poor Precision
8	31/07/2012	28/08/2012	11.5	12.6		12.1	0.78	6.45	6.99	Good
9	28/08/2012	26/09/2012	10.5	10.1		10.3	0.28	2.75	2.54	Good
10	26/09/2012	30/10/2012	19.2	16.9		18.1	1.63	9.01	14.61	Good
11	30/10/2012	28/11/2012	15.4	16.8		16.1	0.99	6.15	8.89	Good
12	28/11/2012	04/01/2013	26.0	17.2		21.6	6.22	28.81	55.91	Poor Precision
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ID: DT13 Bathgate High St

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8%   (-22% - 6%)

Information about tubes to be adjusted
Diffusion Tube average: 14 μgm^{-3}
Average Precision (CV):   6
Adjusted Tube average: 15 +/- 4 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10%   (-24% - 4%)

Information about tubes to be adjusted
Diffusion Tube average: 14 μgm^{-3}
Average Precision (CV):   9
Adjusted Tube average: 16 +/- 4 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012	31.6	32.5	33.5	32.5	0.95	2.92	2.36	Good
2	01/02/2013	29/02/13	27.3	28.3	23.5	26.4	2.53	9.60	6.29	Good
3	29/02/2012	27/03/2012	26.8	24.9	23.2	25.0	1.80	7.21	4.47	Good
4	27/03/2012	26/04/2012	23.4	22.6	23.7	23.2	0.57	2.45	1.41	Good
5	26/04/2012	29/05/2012	14.7	14.5	15.0	14.7	0.25	1.71	0.63	Good
6	29/05/2012	26/06/2012	15.5	18.2	16.8	16.8	1.35	8.02	3.35	Good
7	26/06/2012	31/07/2012	17.0	14.4	15.7	15.7	1.30	8.28	3.23	Good
8	31/07/2012	28/08/2012	21.3	22.2	21.1	21.5	0.59	2.72	1.46	Good
9	28/08/2012	26/09/2012	17.2	17.9	17.3	17.5	0.38	2.17	0.94	Good
10	26/09/2012	30/10/2012	27.2	27.6	23.9	26.2	2.03	7.74	5.04	Good
11	30/10/2012	28/11/2012	22.1	24.0	26.0	24.0	1.95	8.11	4.84	Good
12	28/11/2012	04/01/2013	29.9	42.5	41.6	38.0	7.03	18.50	17.46	Good
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ ID: DT 14 Linlithgow Auto Unit

Jaume Targa, for AEA

Version 04 - February 2011

Adjusted measurement   (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
 Tube Precision: 5   Automatic DC: 100%
  Bias factor A: 1.09 (0.94 - 1.29)
     Bias B: -8%   (-22% - 6%)

Information about tubes to be adjusted
 Diffusion Tube average: 23 μgm^{-3}
 Average Precision (CV):   7
 Adjusted Tube average: 26 +/- 6 μgm^{-3}

Adjusted measurement   (95% confidence level)
with all data
Bias calculated using 12 periods of data
 Tube Precision: 8   Automatic DC: 100%
  Bias factor A: 1.11 (0.97 - 1.31)
     Bias B: -10%   (-24% - 4%)

Information about tubes to be adjusted
 Diffusion Tube average: 23 μgm^{-3}
 Average Precision (CV):   7
 Adjusted Tube average: 26 +/- 6 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012	45.6	50.7		48.2	3.61	7.49	32.40	Good
2	01/02/2013	29/02/13	45.8	40.4		43.1	3.82	8.86	34.31	Good
3	29/02/2012	27/03/2012	36.0	39.7		37.9	2.62	6.91	23.51	Good
4	27/03/2012	26/04/2012	31.7	39.1		35.4	5.23	14.78	47.01	Good
5	26/04/2012	29/05/2012	21.3	13.8		17.6	5.30	30.22	47.65	Poor Precision
6	29/05/2012	26/06/2012	33.0	30.6		31.8	1.70	5.34	15.25	Good
7	26/06/2012	31/07/2012	28.8	24.0		26.4	3.39	12.86	30.49	Good
8	31/07/2012	28/08/2012	36.2	39.9		38.1	2.62	6.88	23.51	Good
9	28/08/2012	26/09/2012	28.5	34.3		31.4	4.10	13.06	36.85	Good
10	26/09/2012	30/10/2012	44.6	46.0		45.3	0.99	2.19	8.89	Good
11	30/10/2012	28/11/2012	39.7	38.5		39.1	0.85	2.17	7.62	Good
12	28/11/2012	04/01/2013	58.2	57.3		57.8	0.64	1.10	5.72	Good
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA
Version 04 - February 2011

Site Name/ID: DT 15 Linlithgow High St NW

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8% (-22% - 6%)
Information about tubes to be adjusted
Diffusion Tube average: 39 μgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: 43 +/- 11 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10% (-24% - 4%)
Information about tubes to be adjusted
Diffusion Tube average: 38 μgm^{-3}
Average Precision (CV): 9
Adjusted Tube average: 42 +/- 10 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012	39.3	41.0		40.2	1.20	2.99	10.80	Good
2	01/02/2013	29/02/13	42.0	49.1		45.6	5.02	11.02	45.11	Good
3	29/02/2012	27/03/2012	Missing	42.9						
4	27/03/2012	26/04/2012	42.3	39.1		40.7	2.26	5.56	20.33	Good
5	26/04/2012	29/05/2012	26.6	16.2		21.4	7.35	34.36	66.07	Poor Precision
6	29/05/2012	26/06/2012	32.5	32.3		32.4	0.14	0.44	1.27	Good
7	26/06/2012	31/07/2012	31.9	29.7		30.8	1.56	5.05	13.98	Good
8	31/07/2012	28/08/2012	44.5	43.1		43.8	0.99	2.26	8.89	Good
9	28/08/2012	26/09/2012	39.0	40.6		39.8	1.13	2.84	10.16	Good
10	26/09/2012	30/10/2012	47.8	48.4		48.1	0.42	0.88	3.81	Good
11	30/10/2012	28/11/2012	55.8	47.2		51.5	6.08	11.81	54.64	Good
12	28/11/2012	04/01/2013	50.5	53.8		52.2	2.33	4.47	20.97	Good
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Site Name/ID: DT 16 Linlithgow High St SW

Version 04 - February 2011

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8%   (-22% - 6%)

Information about tubes to be adjusted
Diffusion Tube average: 42 μgm^{-3}
Average Precision (CV):   5
Adjusted Tube average: 46 +/- 11 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10%   (-24% - 4%)

Information about tubes to be adjusted
Diffusion Tube average: 41 μgm^{-3}
Average Precision (CV):   7
Adjusted Tube average: I5 +/- 11 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Data Quality Check
Perio d	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012	49.2	44.8		47.0	3.11	6.62	27.95	Good
2	01/02/2013	29/02/13	44.2	36.1		40.2	5.73	14.27	51.46	Good
3	29/02/2012	27/03/2012	33.7	34.8		34.3	0.78	2.27	6.99	Good
4	27/03/2012	26/04/2012	25.6	32.1		28.9	4.60	15.93	41.30	Good
5	26/04/2012	29/05/2012	16.2	12.4		14.3	2.69	18.79	24.14	Good
6	29/05/2012	26/06/2012	19.2	20.3		19.8	0.78	3.94	6.99	Good
7	26/06/2012	31/07/2012	18.7	18.2		18.5	0.35	1.92	3.18	Good
8	31/07/2012	28/08/2012	24.8	27.0		25.9	1.56	6.01	13.98	Good
9	28/08/2012	26/09/2012	24.9	26.7		25.8	1.27	4.93	11.44	Good
10	26/09/2012	30/10/2012	39.4	40.1		39.8	0.49	1.25	4.45	Good
11	30/10/2012	28/11/2012	38.6	44.0		41.3	3.82	9.25	34.31	Good
12	28/11/2012	04/01/2013	50.9	50.2		50.6	0.49	0.98	4.45	Good
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ID: **DT 17 Linlithgow High St NE**

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5 Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8% (-22% - 6%)

Information about tubes to be adjusted
Diffusion Tube average: 32 μgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: 35 +/- 9 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8 Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10% (-24% - 4%)

Information about tubes to be adjusted
Diffusion Tube average: 32 μgm^{-3}
Average Precision (CV): 7
Adjusted Tube average: 36 +/- 8 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

										Data Quality Check
		Diffusion Tubes Measurements								**Diffusion Tubes Precision Check**
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	
1	06/01/2012	01/02/2012	49.2	37.9		43.6	7.99	18.35	71.79	Good
2	01/02/2013	29/02/13	45.3	49.2		47.3	2.76	5.84	24.78	Good
3	29/02/2012	27/03/2012	44.9	44.3		44.6	0.42	0.95	3.81	Good
4	27/03/2012	26/04/2012	29.3	36.0		32.7	4.74	14.51	42.57	Good
5	26/04/2012	29/05/2012	18.7	15.2		17.0	2.47	14.60	22.24	Good
6	29/05/2012	26/06/2012	28.9	31.0		30.0	1.48	4.96	13.34	Good
7	26/06/2012	31/07/2012	26.1	24.6		25.4	1.06	4.18	9.53	Good
8	31/07/2012	28/08/2012	37.9	37.0		37.5	0.64	1.70	5.72	Good
9	28/08/2012	26/09/2012	36.2	36.3		36.3	0.07	0.20	0.64	Good
10	26/09/2012	30/10/2012	43.3	41.9		42.6	0.99	2.32	8.89	Good
11	30/10/2012	28/11/2012	47.5	47.4		47.5	0.07	0.15	0.64	Good
12	28/11/2012	04/01/2013	66.2	49.5		57.9	11.81	20.41	106.10	Poor Precision
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ID: DT 18 Linlithgow High St SE

Adjusted measurement   (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8%   (-22% - 6%)

Information about tubes to be adjusted
Diffusion Tube average: 37 μgm^{-3}
Average Precision (CV):   6
Adjusted Tube average: 40 +/- 10 μgm^{-3}

Adjusted measurement   (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10%   (-24% - 4%)

Information about tubes to be adjusted
Diffusion Tube average: 38 μgm^{-3}
Average Precision (CV):   7
Adjusted Tube average: I3 +/- 10 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
				Diffusion Tubes Measurements						**Data Quality Check**
1	06/01/2012	01/02/2012								
2	01/02/2013	29/02/13								
3	29/02/2012	27/03/2012								
4	27/03/2012	26/04/2012								
5	26/04/2012	29/05/2012								
6	29/05/2012	26/06/2012								
7	26/06/2012	31/07/2012	28.0	24.5		26.3	2.47	9.43	22.24	Good
8	31/07/2012	28/08/2012	36.3	35.9		36.1	0.28	0.78	2.54	Good
9	28/08/2012	26/09/2012	31.7	34.5		33.1	1.98	5.98	17.79	Good
10	26/09/2012	30/10/2012	41.3	44.2		42.8	2.05	4.80	18.42	Good
11	30/10/2012	28/11/2012	37.9	40.6		39.3	1.91	4.86	17.15	Good
12	28/11/2012	04/01/2013	54.0	52.3		53.2	1.20	2.26	10.80	Good
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ID: **DT 19 Linlithgow High St N**

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8%   (-22% - 6%)

Information about tubes to be adjusted
Diffusion Tube average: 38 μgm^{-3}
Average Precision (CV):   5
Adjusted Tube average: 42 +/- 10 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10%   (-24% - 4%)

Information about tubes to be adjusted
Diffusion Tube average: 38 μgm^{-3}
Average Precision (CV):   5
Adjusted Tube average: I3 +/- 10 μgm^{-3}

Adjustment of DUPLICATE or TRIPLICATE Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Data Quality Check — Diffusion Tubes Precision Check
1	06/01/2012	01/02/2012								
2	01/02/2013	29/02/13								
3	29/02/2012	27/03/2012								
4	27/03/2012	26/04/2012								
5	26/04/2012	29/05/2012								
6	29/05/2012	26/06/2012								
7	26/06/2012	31/07/2012	27.5	26.9		27.2	0.42	1.56	3.81	Good
8	31/07/2012	28/08/2012	40.2	40.3		40.3	0.07	0.18	0.64	Good
9	28/08/2012	26/09/2012	36.4	36.5		36.5	0.07	0.19	0.64	Good
10	26/09/2012	30/10/2012	47.4	43.5		45.5	2.76	6.07	24.78	Good
11	30/10/2012	28/11/2012	46.2	51.6		48.9	3.82	7.81	34.31	Good
12	28/11/2012	04/01/2013	50.1	52.7		51.4	1.84	3.58	16.52	Good
13										

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Jaume Targa, for AEA

Version 04 - February 2011

Site Name/ ID: DT 20 Linlithgow High St S

Adjusted measurement   (95% confidence level)
Without periods with CV larger than 20%
Bias calculated using 11 periods of data
Tube Precision: 5   Automatic DC: 100%
Bias factor A: 1.09 (0.94 - 1.29)
Bias B: -8%   (-22% - 6%)

Information about tubes to be adjusted
Diffusion Tube average: 42 μgm^{-3}
Average Precision (CV):   3
Adjusted Tube average: 45 +/- 11 μgm^{-3}

Adjusted measurement   (95% confidence level)
with all data
Bias calculated using 12 periods of data
Tube Precision: 8   Automatic DC: 100%
Bias factor A: 1.11 (0.97 - 1.31)
Bias B: -10%   (-24% - 4%)

Information about tubes to be adjusted
Diffusion Tube average: 42 μgm^{-3}
Average Precision (CV):   3
Adjusted Tube average: 46 +/- 11 μgm^{-3}